



SATURDAY, JULY 19, 1873.

## Ludwig's Car Wheel.

The accompanying illustration, taken from *Engineering*, shows a somewhat novel construction of chilled cast-iron railway wheels with wrought-iron spokes, of which a pair are exhibited at Vienna from Mr. C. I. Bergmann's foundry and iron works, of Graz, Styria. These wheels, which have been designed and patented by Mr. Ludwig, the manager of the above works, are intended as substitutes for the chilled cast-iron disk wheels in use to some extent on Austrian and German railways, and their construction will be readily understood from the engraving. The rim is cast in a chill, and from its form it can, without risk, be cast of harder iron than is usually employed. The rim and boss are connected by wrought-iron spokes as shown, and the wheel is stated to be capable of being broken only with great difficulty. One hundred and sixty pairs of these wheels have already been running about a year on the Graz-Köflacher Railway, and they are stated to have given good results.

## State and Private Railroads.

A Prussian view of the policy of State management, which we translate from an article contributed to the *Deutsch-Amerikanische Economist* will be found interesting.

In England and the United States various very unsatisfactory developments in the management of transportation by private railroad companies recently have directed the attention of competent circles to the question: How best could these evils be avoided? and some voices are heard pronouncing in favor of transferring the railroads into the hands of the government as the simplest solution of the difficulty. It must be admitted that in Germany, principally on account of better control on the part of the government, railroad affairs do not give occasion for complaint to so great an extent as in England and America; still it cannot be denied that it would be well to have greater clearness in our railroad management.

It is not claimed that the following propositions contain ideas entirely new; their aim is only to furnish independently and, so far as possible in a form generally intelligible, contributions toward the examination of questions whose solution undoubtedly would be for the interest of the community, and whose practical accomplishment in some way or other is certainly an important problem for the Legislature.

The question, whether railroads should be in the hands of the government or in those of private companies, is, under the existing circumstances—State railroads existing together with private railroads—to be considered as an open one. That this question will always remain an open one—that is, that the State railroad and private railroads will always exist side by side—is a proposition which certainly gives room for much discussion, and against which many strong objections may be raised.

The circumstances to be mentioned herewith have convinced the writer of these lines that important considerations affecting the public interests decidedly favor the transfer of railroads into the hands of the government. This contradicts the saying which so many set up as an axiom—that the government should not meddle with any branch of industry. There is much truth in this saying; but with regard to certain industrial enterprises, such as the postal service and railroad transportation, a limitation of it must be acknowledged as admissible in the public interest. That railroad traffic is, in a high degree, a matter of public interest, is beyond any doubt.

For explanation and proof of the opinion which has been intimated, we will have to discuss the following propositions:

1. Which best answers the public interests: placing the management of railroads in the hands of the government, or in those of private corporations?

2. Is there any sufficient evidence that the management of railroads should be partly by the government and partly by corporations?

To discuss the first question fundamentally, and with the facts at hand, would require an immense material, which we cannot produce here. From a few standpoints only will we clear up the subject. That the government, representing the public interest, does not care so much for the most complete development of traffic as the companies do, is a mere matter of course. The government may be satisfied with securing from the working of the road, after covering the working expenses, sufficient to meet the interest on the capital invested in the property, while the private investor will strive to secure for himself the highest possible interest on his capital. This can be had only when the private investor asks for the service a higher price than expenses simply, including the interest on the investment, amount to. The reduction of the price of transportation down to the limit of the mere expenses is possible only when the government is owner of the railroad and manages its traffic itself; and that the greatest possible reduction of the cost of transportation of passengers and goods serves the public interest much more than gaining of fat dividends by a small number of shareholders is beyond question.

A leading objection against the management of railroads by the Government is this: that the impulse of competition is lacking, and consequently that less attention is paid in rendering the services. But, on closer consideration, this objection loses very much of its weight. Competition has not shown itself very favorable to the public interests in all these immense railroad enterprises. The competition between railroads is always necessarily limited. At least there are examples enough of bitter contests between railroad companies in England and America. This competition has in many cases led to the construction of two lines between two points, and to an enormous reduction in rates of transportation. The advantage to the community by these contests is, however, quite problematical and transient. The competition leads either to the ruin of one

of the parties or to an agreement and in consequence to the monopoly of the traffic. The countries where private industries can undertake railroad business in the freest manner, as England and the United States, show the most unsatisfactory results. Nowhere are there so many complaints over high freight tariffs and the depression of trade through the policy of the railroad companies as in England and America. A prompt regulation of the prices for the services of railroads through competition is not possible, since the establishment of these enterprises requires far too much capital for us to expect the ordinary working from freedom of competition.

Another objection raised against the working of railroads by the State is, that the official management is less inclined to the introduction of improvements for facilitating business than is a private company. Were this objection well founded, still the effect of this disadvantage might be neutralized if on the part of the higher officers care was taken that the complaints of the public against the service should receive the proper consideration. And it might even be confidently expected that a State management would be less opposed to the introduction of improvements than a private management. For any complaints against State officers are easily presented before a competent tribunal, if they are brought forward in the legislative body; while it is difficult to induce the directors of a private company to do away with evils, unless it can be done without loss to the company.

Another important question is: Whether, when the railroad traffic is concentrated in the hands of the government, its tendency will be to extend the railroads to all the districts where a line is needed. With reference to this, there is no evidence that the railroads managed by the Government should be behind the private companies. There will be undoubtedly many demands upon the government to build roads, and it is rather to be feared that the public treasury will be burdened for the construction of too many roads, than that well-founded demand for railroads—that is, demands for lines which have good prospects of paying—would be left unconsidered by the State longer than would be the case with private corporations.

That the State is not in position to construct railroads so cheaply as private companies is generally accepted as an incontrovertible, recognized fact. Let us consider, however, that nowadays those who undertake private railroad enterprises are no longer individuals, but great financial institutions and corporations; and then it appears that cheapness is hardly served in the private construction to any noteworthy degree on account of the private interests involved.

One can hardly expect the directors of great joint-stock companies, though they must share in the results of their management, to protect the interests of those who have chosen them

prises. In regard to that, the government has the right to purchase the property of railroads for a full compensation. The other regulations to be observed are according to the following principles:

1. The cession cannot be demanded until the expiration of 30 years from the time of opening the road for traffic.

2. Likewise it can only be demanded from such time as a new arrangement of tariffs would be necessary.

The company whose road is to be taken must be notified of the intention to take possession of the road at least a year before the time appointed for taking it.

The compensation for the road is made according to the following principles:

a. The State pays the company twenty-five times the amount of the average yearly dividends paid to all the shareholders in the course of the last three years.

b. The debts of the company will be assumed by the State, in the same manner as they would have been obligatory upon the company, and they will be paid from the State treasury, and on the other hand all accounts receivable of the company pass into the State treasury.

c. In the fulfillment of these obligations, not only does the possession of the road and the material for transportation pass over to the State, but also any reserve fund accumulated by the company.

d. Until the time when a settlement is made with the company, regulated according to the foregoing principles, until the stock is redeemed and the debts are assumed, the company remains in the possession and use of the road.

## Railroad Inspection and Inspectors.

The letter that we print below, written something over a year ago, was addressed to the General Superintendent of one of the principal railroads in the West. Encouraged by the favorable reception of this letter, which, as he says, purports to be "no more than an outline of a plan that, if approved, may be hereafter given in detail," the writer subsequently elaborated his idea, and, as originally intended in his scheme, made his proposed "Inspector" the head of a "Bureau of Inspection and Statistics."

We not long since had an opportunity of reading a volume of reports, in manuscript, made by Mr. Goodwin, in detailed explanation of his proposed system, and in exemplification of its

value when practically applied. These reports were made for an important railroad shortly after the accession of a new administration, and largely for the information of the new manager. They covered a great variety of subjects—the condition of various stations and office-buildings and their fitness for certain proposed purposes; the capacity of sundry terminal facilities for special freights; the disposition of tracks and buildings in yards where buildings had been destroyed or traffic often clogged; the organization and reorganization of departments so as to secure promptness, efficiency, and to prevent peculation, etc. It was evident, at a glance, that the reports must have been of great value, and that through them and others similar a manager might keep himself constantly informed of the condition of the property he was working, and better than in any other way of the manner in which the army of men in the company's service performed their work, which, we may say, is information which managers frequently do not possess.

It is true that such reports as those

we saw could only be prepared by a person of wonderful versatility, and such a knowledge of nearly all branches of railroad working and administration as very few men possess. But while it will never be easy to find an inspector capable of criticizing suggestively station-yards, car construction, systems of purchasing supplies, the management of ferries, the quality of fuels, the handling of petroleum, the management of trains, &c., it will be reasonably easy to organize a staff of inspectors which can do all those things. Directly or indirectly inspection must be had, if the road is not worked blindly, and it is a proper recognition of their importance, and the regular organization of a system which needs advocacy:

SIR—During my conversation with you yesterday evening, where a few of the very many questions involved in the general problem of railway management were briefly discussed, you were so kind as to say that you would give your careful attention to any written communication on the subject named that I might submit for your consideration; and that in case any suggestion thus presented recommended itself as worthy of adoption, you would give it the benefit of your approval.

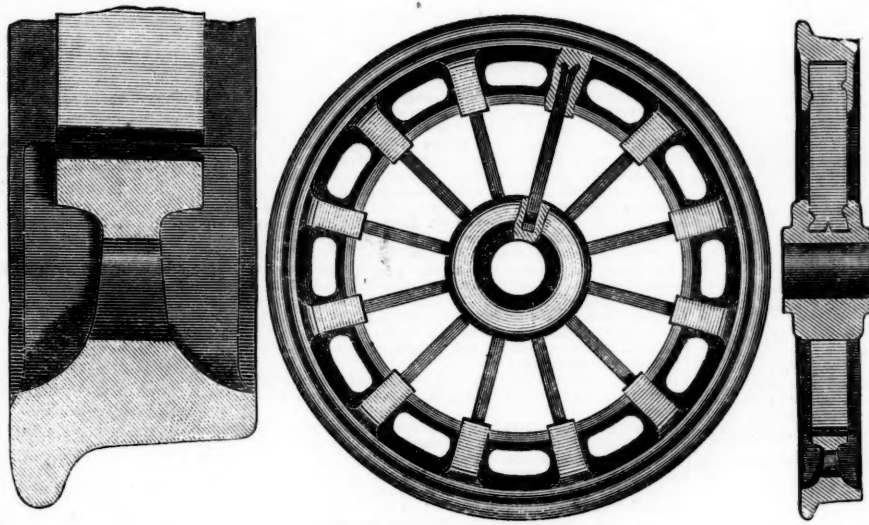
This would ordinarily appear to be only the matter-of-course expression of interest that a gentleman occupying a position like your own would make in like case; considering this fact, I think you will excuse me for explaining that I accept your words as an assurance, and, moreover, as an implied invitation.

Without these encouragements I should not consider myself warranted in encroaching upon your time in order to make any "suggestions" to you in a matter wherein you have such long and varied experience, nor is it now my purpose to do more than outline a plan that, if approved, may be hereafter given in detail.

Several practical "railroad men," among whom I am allowed to name Mr. P. H. Watson and Mr. C. F. Hatch, have expressed to me favorable opinions of this general plan, and should you concur with them I shall hope that you and the managers of the line of which you have charge will authorize an experimental appointment in order to test its efficacy.

In passing it is pertinent, I think, to note that the introduction into any system of anything new almost invariably excites the unreasonable opposition on the part of those who are thereby disturbed in any habit of thought or action; the opposition is unreasonable inasmuch as it arises simply from that dislike for change in forms that is inherent in men.

This dislike has given a notable sign of its power in the perversion of the good word "innovation," which, while it really means only the change made by the introduction of something new, is misused so as to convey the idea of a change that dis-



LUDWIG'S CAR WHEEL.



in the established rules and modes without securing an equivalent advantage.

No person would desire the reputation of an innovator if the name were to be given its perverted significance, but as matters stand one has to risk the chances, not only of being called an "innovator" in the bad sense of the term, but of being stigmatized as a would-be innovator, whose schemes have been baffled.

I say this much on this point because it seems to me to be of primary importance to inquire as to whether any change in railway administration is to work benefit enough to warrant the disturbance of well-fixed habits and ideas in the minds of employees; at the same time it does not appear that the introduction into the economy of a railway of the plan herein described will make necessary any embarrassing change in any form of routine, nor indeed do more than establish some readily-adjusted relations affecting a few of the principal officers of the road.

It seems unnecessary to enter into any extended review of the progress of railroads in this country for the purpose of noticing the various causes that have, from time to time, had the effect of modifying in many ways the duties of Superintendents of railway lines; still it will be well to glance at the suggestive fact that since the year 1849, when the writer took, under your direction, his first lessons in practical engineering, there have been constructed in the United States not less than 45,000 miles of railroad, and that a very large proportion of this great aggregate of road is now operated under that system of consolidation of properties and interests which has for one of its marked results a very great increase of the amount of line of which one general superintendent has charge.

The titles "General," and "Division," or "Assistant" Superintendent indicate the extension of the jurisdiction of the original Superintendent; and the employment of train dispatchers and other aides is evidence of the necessity for dividing and subdividing the labor originally performed by the one officer. The General Superintendent does not feel, however, that he is relieved of any final responsibility by these distributions, and nothing less than a direct knowledge of the entire line, and frequently of the minutest details of special matters, can satisfy the demands made upon him by his sense of the duties of his position; while this is the case his examinations of such special matters are necessarily less complete than they would be were it possible for him to devote to them a reasonable amount of time.

The results of the investigations made in behalf of the company into the causes of accidents upon railways are usually unsatisfactory, largely for the reason that the evidence is thoroughly one-sided. The Court in such a case being the Superintendent in his office, and the witnesses trainmen, for instance, the testimony frequently goes to show that no blame should be attached to anybody, and while incredulous and dissatisfied, and desirous of sifting the matter to the bottom, the Court is forced to bring the hearing to a close because of the lack of time to prosecute further inquiry.

The close and systematic examination of the scene of collision before the wreck is removed, or even of the wreck and the place of the accident separately, by a person of experience and good judgment, would result in a more correct analysis of facts of a certain class than could be formed from the testimony of the employees, who would ordinarily be questioned in such a case, and if the person making this examination were to conduct also an investigation into all the facts soon after, and as near the scene of the accident as practicable, his report would in most cases show the matter in its true light.

It is essential that the causes of undesirable effects, wherever such effects may be produced, be ascertained and studied with reference to well-established principles, and in regard to each other, in order that preventives may be devised and applied.

It is also very necessary that undesirable conditions be changed for the better, and that wherever a want exists it should be supplied.

I believe that in your experience of the working of your line you notice and deplore instances of such undesirable effects and conditions, and that you would, if it were practicable for you to do so, promptly take steps to prevent the one and supply and change the others. I think that any judicious effort made for the purpose of bringing about these results cannot fail to secure, to the railway affected by it, advantages that will amply compensate the expense thereby incurred.

For the purpose then of supplying the assistance necessary to secure a more thorough collection of data, and information generally, and especially information that is not readily come at, I propose placing under the immediate orders of the person occupying the position equivalent to that of General Manager of a road, an officer whose position would well be defined by the title of Commissary—one who is sent or delegated to execute some duty in the place or as the representative of his superior, but who should perhaps receive the title of Inspector. This officer, while regularly recognized as the head of one of the departments of the administration of the affairs of the railway company employing him, would act under special instructions and I would have authority as it would be given him for special purposes. He would be called upon as occasion required to devote his attention to the investigation of the causes and incidents of accidents on the line, including fires, and to the examination of particular cases where abuses or irregularities may be suspected; it will be his duty to make use at all times of his opportunities for observation and to submit reports that should be receipts for records kept by him, wherein all facts in any way affecting the line that may come to his knowledge should be entered in detail, and make such suggestions, regarding the economy of the road, as may in his view seem pertinent and likely to be useful.

I am varied to be brief, and though I bring my letter to a rather abrupt close, think I have said enough to put the case fairly before you. If I have excited your interest you will perhaps wish to consider the subject further. In any case, I shall be glad to know your opinion thereupon.

Respectfully,

J. M. GOODWIN.

#### Pneumatic Foundations—Col. Washington Roebling's Reply to Captain Eads.

In the RAILROAD GAZETTE of May 10 we published a letter from Captain James B. Eads, Engineer of the St. Louis Bridge, which was published also in *Engineering* of May 16. Mr. Roebling, who was then, and is now, in Europe, has replied in the following letter, dated at Wiesbaden, June 12, and published in *Engineering* of June 27:

In your issue of May 16 I notice a letter on "Pneumatic Foundations," written by Captain James B. Eads, of St. Louis, in which he takes occasion to accuse me of wholesale robbery, not only of his own ideas in regard to caissons, but also those of several others.

Its perusal has left only the one prominent impression on my mind, that his skill in blowing his own trumpet is only surpassed by his art in writing abusive and unjust articles about other people. I may say, in addition, that the regret I feel at the course the gentleman has seen fit to pursue is enhanced by the fact that our relations had hitherto been most friendly, and that on no occasion can I tax myself with having failed to speak of him in any terms but those of the highest admiration and respect.

His statements appear to have for their incentive a paragraph from page 71 of my recent pamphlet on "Pneumatic Tower Foundations of the East River Bridge," and inasmuch as,

owing to my absence abroad, some time has elapsed since May 16, I may be excused for reproducing it, in order to refresh the public mind. It is as follows: "The idea of placing the air lock at the bottom of the air shaft, below the water level, in place of above it, is not new, having been proposed in England as long ago as 1831 by Lord Cochrane, and again by Mr. Bush in 1841, and still later, in 1850, by Mr. G. Pfauemüller, of Mayence. It nevertheless remained for Captain Eads, in his St. Louis caissons, to make the first practical application of the same, on a really large scale, in this country."

This is the harmless paragraph which appears to have aroused the Captain's ire, and led him to indulge in an attack of a nature but seldom met with in the annals of engineering controversy.

To an unprejudiced mind it will read precisely as it stands, that Captain Eads was the first to actually apply the idea of the submerged air locks in caissons, although the idea in the abstract had occurred to others before. I can see therein no attempt on my part to impugn the entire originality of the invention, as far as he may be concerned, and have, indeed, too high an appreciation of his remarkable inventive talent to be justified in anything of the sort. If that had been my intention, I certainly would not have alluded to three such unimportant examples as those mentioned above, but should have mentioned a caisson with a lock at the bottom of the air shaft sunk at Colonges, on the Rhone, twelve miles below Geneva, in 1869, or I might have referred to the ingenious arrangement of several locks on the roof of the air chamber of a caisson, as patented in France, July 12, 1868, by the submarine engineer, M. Castor, both of which cases might have come under the observation of Captain Eads when visiting France in 1869, in search of information concerning caissons.

My visit to St. Louis in April, 1870, to which such feeling allusion is made, was indeed one of great interest, and in return for the courtesy then extended to me, it would have afforded me great pleasure to have given all possible credit to him, were it not for the fact that I am equally indebted to Mr. F. E. Sickles, who was then sinking the cylinders of the Omaha Bridge, in eighty or ninety feet of water, with the air lock at the bottom of the shaft. I am compelled to state, however, in justice to myself, that in the arrangement of the New York caisson I was not influenced in the slightest degree by the work of Captain Eads, but was altogether governed by the exceptional conditions of a case entirely different from those of an ordinary river pier.

My actual experience in the St. Louis caisson consisted in nearly breaking my neck, and being half-drowned in the bottom of a pitch-dark hole—certainly a forcible way of reminding one where the lock was located. With this impression I left St. Louis. It was not until receiving, seven months afterward, his October report, that I understood how the locks were arranged.

The double locks of the New York caisson I designed in May, 1870. In October following I saw for the first time his plan for the eastern abutment caisson, which also has a double lock, and was quite as much surprised as Captain Eads to notice their close resemblance.

I was, however, still more astonished to see reproduced in this plan of the eastern abutment caisson all the main features of the Brooklyn caisson. There was the same compact heavy timber roof, composed of sticks crossing each other at right angles, well bolted together, and calculated, by their elasticity, to yield to uneven pressures over a large area without breaking. There were the massive wooden sides competent to resist any strain, whether from without or within, or from an uneven support, a point in which the St. Louis channel caissons were notoriously weak.

Has Captain Eads ever acknowledged his indebtedness on this point? No! not within the past three years, nor do I ever expect it. How far he may have been aided in the adoption of this arrangement by a visit to the Brooklyn caisson, before its launch, I do not pretend to say, but I do know that during my visit to St. Louis he ridiculed the idea of timber, and confidently predicted the upsetting of our caisson the first time it was inflated.

It may of course be easy to answer that one has the right to profit by his own experience; but that is precisely what I claim also.

The principal point of dispute, however, between us is as follows: Captain Eads virtually makes the broad claim that any device which has been used in a pneumatic cylinder can be made the subject of a new patent when applied to a "masonry caisson," and in that spirit has had several patents granted. I choose to differ with him on that point, and before paying the round sum with which he proposes to tax the engineering world for the next fifteen years, I have preferred to leave the matter to the decision of the courts at law, where it is now being tried.

It is through this circumstance that the reader will be able to understand the animus of the attack upon me, when the paragraph from my pamphlet would fail to supply it. And, moreover, a judicial decision must incline toward the side carrying the greatest weight of evidence from experts, I am forced to look on his article as a mere effort to manufacture public opinion in his favor.

The air lock patent of Captain Eads is one simply of position in connection with a "masonry caisson," a distinct disclaimer being made of a prior patent as applied to pneumatic cylinders; nor is any device about the lock itself claimed. Now an air lock is merely a contrivance by which to effect an interchange between two masses of air in a different state of tension, being entirely independent of the place where these masses are contained, be the same a round box or square, rectangular or elliptical, with an area of 18 square feet or 18,000, loaded with stone, concrete or wood, or not loaded at all. You might as well patent contrivances in a ship's rigging if she were loaded with grain or with cotton, or entirely empty. Of a similar character is his general claim for any pipe that may be used for sending any material into or out from the air chamber of a caisson, when it is well known that pipes have long been used for similar purposes in cylinders. In this respect even the supply shafts of Pfauemüller have been closely touched upon, the word shaft being changed to pipe, and the diameter reduced from 21 in. to 6 in., with a corresponding reduction of efficiency. But the magic word of "masonry caisson" seems to be all-sufficient for the endowment of patentability.

That unique piece of involved composition, in which the captain by a species of *coup de riposte*, attempts to throw back upon me the full weight of Pfauemüller's caisson, is altogether lost because it lacks the best of all foundations—truth. So far from the Brooklyn caisson being a copy of Pfauemüller's plan, it has been carried out precisely as designed by the late John A. Roebling in 1868, even including the water-tight wooden lining of the inner coffer-dams on which Captain Eads lays so much stress, and which were a self-evident arrangement resulting from the plan of masonry. I know that every feature therein was original except the water shafts, which may perhaps be ascribed primarily to the same Lord Cochrane. It was, in fact, a simple repetition of the timber foundation of the Cincinnati bridge, modified sufficiently so as to answer as a caisson, and I am equally certain that Mr. Roebling had never even heard of Pfauemüller. In the same year, 1868, Captain Eads was still on record as the opponent of pneumatic foundations (vide his first report on the St. Louis bridge). It is certainly remarkable that in 1860, already, before any caisson had been sunk at all, there should have been plans so nearly approximating to the best practice of the day, and the existence of which confines Captain Eads' claim entirely to the air chamber.

He indeed makes light of them by stating that Pfauemüller's

lock is 17 feet above the bottom. These 17 feet consist of a height of air chamber of 43 feet, and a further depth of 5 feet of the clumsy cast-iron girder then in vogue. These would be reduced to-day to 8 feet of air-chamber and 3 feet of wrought girder, making a total height of 11 feet, which is just right, because a caisson is usually imbedded from 1 to 2 feet in the ground.

The practice of placing the lock entirely within the air-chamber close to the bottom is one fraught with the greatest danger, especially with a rough bottom and a rise and fall of the tide. I intended to have placed the locks of the New York caisson entirely above the air-chamber, but was deterred by the frightful waste of timber involved.

His remark concerning the external coffer-dam also shows a misapprehension of its object in supposing that it was intended to keep the water out of the air shaft. That would indeed be a piece of folly to expend \$50,000 where \$5,000 would be sufficient.

The function of that coffer-dam was strictly confined to the flotation of a caisson in deep water and a tideway, where any support by screws was out of the question. After the caisson was imbedded some 15 ft. in the soil, this function ceased, and the question arose whether to stop or continue it. The latter was adopted, partly because it protected the supply shafts and sand pipes which were outside the masonry, but principally to form part of a valuable wharf around the town. It also enabled me to lay masonry below the water level throughout the winter.

When the caisson touched rock, it was allowed to fill with water and sand without causing any increase of leakage into the air shafts, which were perfectly protected by the inner lining of the masonry well holes. The water-tight lining of the air-shaft above the timber was necessary to keep out the water slashed in by the dredge bucket which had proved an intolerable nuisance on the Brooklyn side. At any rate the dam proved a complete success, because every contingency had been provided for, whereas for the want of that foresight the one in St. Louis proved a failure.

In conclusion, I beg to assure Captain Eads that I feel perfectly competent to take care of the East River Bridge, and to overcome dangers and difficulties of which he has but little conception.

His magnanimous offer to furnish plans while I attend to their execution, I most respectfully decline. What this implies the reader may infer from the fact that all of the St. Louis caissons together can find room in one of the East River caissons, with space enough left for several more like them. If the reverse were the case the captain would no doubt be much better pleased.

The comparatively small matter of the launching of such a caisson, and its protection from sea worms, cost me more anxiety and thought than the whole sinking of it. And where would you go to find an easier material to sink through than at St. Louis, or a more difficult one than in the East River?

Finally, I would state that this matter of the air lock is, after all, but a very small item in the aggregate of such a structure, and by no means possesses that importance in my eyes which more interested parties may attach to it.

#### Contributions.

##### To Measure a Line which Cannot be Chained.

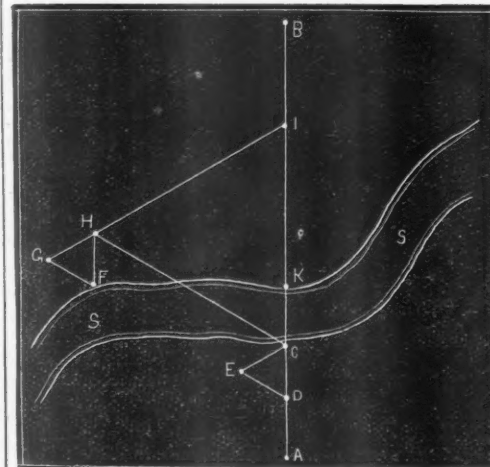
TO THE EDITOR OF THE RAILROAD GAZETTE:

The following method of measuring a line that is intersected by a stream or pond of water, or of measuring the width of such stream or pond of water, either with or without an instrument for taking horizontal angles, is frequently quite convenient, as I have reason to know from actual practice.

As, however, the method is not in general use by surveyors, and as I have never seen it explained or even alluded to in any work on surveying, the subjoined explanation may interest some of your readers.

Let  $AB$  represent the line to be measured, whose length  $AB = x$ ; and let  $S$  represent the stream or pond whose width,  $CK = y$ .

Set a stake at  $C$ , on the margin of the stream or pond, and at the distance  $a$  from  $A$ , and in line with  $AB$ .



Also set a stake at  $D$ , in line with  $AB$ , and at any given distance,  $b$ , from  $C$ . Set a third stake at  $E$ , so that  $CE = DE = b$ . Let two assistants now be sent across the stream with directions to set a stake at any convenient point,  $F$ , in line with  $DE$ , also a stake at  $G$  in line with  $DE$ , and at a distance  $b$  from  $F$ , and a third stake at  $H$ , so that  $FH = GH = b$ .

Lastly, while one of the assistants is directed to set a stake at  $I$ , in line with  $DC$ , let the other assistants stationed at  $G$  have the stake at  $I$  also placed in line with  $GH$ .

Let the distance  $HI$  be measured,  $= c$ , and the distance  $IB = d$ . Also let the distance  $IK = e$  be measured from  $I$  to  $K$  at the edge of the stream. Then because the triangles  $DCE$  and  $FGE$  are equilateral, the triangle  $CHI$  is also equilateral and we have:

$$x = a + c + d \quad (1.)$$

$$\text{and} \quad y = c - e \quad (2.)$$

If the surveyor is provided with an instrument for measuring horizontal angles, with his compass at  $C$  he will direct a flag to be placed at any convenient point,  $H$ , on the opposite side



of the stream, so that the angle  $BCH$  shall =  $60^\circ$ . Then having a flag at  $C$ , and having placed another at  $K$ , he will cross the stream and place his compass at  $H$ , and direct an assistant to place a flag at  $I$ , so that the angle  $CHI$  shall =  $60^\circ$ , and the flag at  $I$  at the same time shall be in line with  $OK$ . Then measuring  $HI = c$ ,  $IB = d$  and  $IK = e$ , the length of the line, and width of the stream will be represented by (1) and (2) as above.

J. E. HENDRICKS.

Des Moines, Iowa, June 28, 1873.

## Some Examples of Bridge "Engineering."

## TO THE EDITOR OF THE RAILROAD GAZETTE:

I believe history declares of the Spartans that it was considered by them to be in no way discreditable to steal, if one could do so without being detected, but the man who was caught at it was disgraced forever. One would think that the same principle was in vogue now with regard to bridge-building. Torrents of newspaper eloquence were poured out on the head of unlucky Mr. Trussdell when a bridge of his gave way under an unusual and extraordinary load, yet if all bridges which are no better than his were to be closed to travel, or even those only which are not really equal to their regular and ordinary loads, what a brisk demand would spring up for skiffs and rope ferries!

The particular occasion for these remarks is a bridge which came under the writer's notice a few weeks since, not a hundred miles from New York by any means, and on a recently constructed branch of one of our most prominent railways, which is an extraordinary example of carelessness or ignorance. It is not intended to make this communication personal, and therefore names are not given; but as the writer has already warned several officers and employees of the company without seeming to cause conviction or measures of precaution, it is sent as an additional caution, or that he may at least have the poor satisfaction of saying, "I told you so."

Incredible as it may seem, the end rods of this bridge—a Pratt truss of 44 feet clear span—are loaded with 43,500 lbs. per square inch, if we assume a running load of 3,000 lbs. to the foot; or, with 34,800 lbs. under a load of 2,400 lbs. to the foot. The cause of the great excess in strain is simply a blunder, the main rods being run in the same direction as the main brace of a Howe truss, and the center rod thus having to support the whole load of half the span. This, however, is by no means the whole difficulty. Had the rods been placed correctly, the load would still be excessive, amounting to 21,750 lbs., or 17,400 lbs. per square inch, according to the running load assumed; the main and center rods, and indeed all the rods throughout the bridge being of the same dimension, viz.: inch and a quarter iron, reduced to an effective section of about .8 of a square inch by the cutting of the threads.

The bridge is a double-track "jack-knife" draw, the rail running directly over each of the trusses, which are entirely independent. For such a bridge the larger of the loads assumed above, or 1,500 lbs. for each truss, is certainly not excessive, as the swaying of the locomotive is liable to throw at times nearly the whole load on a single truss. Those disposed to check the calculation of strains can easily do so. The truss is divided into 16 panels, and the chords are 3 ft. 6 in. from center to center at each end, and 4 ft. in the center. Size of lower chord, 10x16; effective section, about 9x15, and other dimensions as above.

A curious circumstance in connection with the structure is that the bridge builders have put the rods in wrong in only three of the trusses, and in the fourth have run them in the right direction, as if trying to suit all tastes and disclaim any bigoted prejudice or partiality. The writer asked of one of the hands the cause of this, suggesting that they had discovered their error in framing the last one. "Oh, no," said he, "we framed that one first, and then we thought it didn't look exactly right, so we framed the others the other way."

Under the passage of trains one of the natural results has followed. The two main (?) rods project half an inch from their washers, while the single counter rods have pressed their washers deeply into the oaken angle blocks, and the truss, which at first had an excessive camber, has now a very perceptible one in the other direction. This settlement is probably not due as yet to any giving way of the rods, but the consequences which must flow from an undetected flaw in any one of eight or ten of them are evident. It should be mentioned that the rods appear to be of very poor quality, apparent marks of imperfect welding being visible on most of them. Probably most of the rods would not test to 50,000 lbs., though in this matter the writer does not pretend to be a competent judge.

It may fairly be wondered how it is that such a bridge sustains the daily passage of trains. This may be partly due to the chords acting in some slight degree as beams, the tensile strain in them being only 200 to 250 lbs. per square inch of effective section; but it must be principally owing to a succession of happy accidents, and an extra man or two on the locomotive is liable any day to settle the question—and the bridge. It is to be hoped that this man will not be the former "engineer" in charge.

Another example of dangerous bridge construction which fell under the writer's notice might be mentioned here, though it was far less inexcusable. This was a highway bridge over the Huron River at Rockwood, Mich., consisting of three spans of 60 feet each of the common king and queen truss pattern. The lower chords of the truss had, of course, to be spliced, and the builder, apparently supposing that the only object of the chord was to sustain his floor-beams, made this splice by chamfering off the ends of the sticks and overlapping them, and then bolting them together with two  $\frac{1}{2}$  bolts. Under a load the chord of course stretched two or three inches, and the bridge has settled greatly, the bolt-heads being drawn in nearly their thickness into the wood. The man attempted to repair the trouble by inserting wooden vertical posts by the side of the rods, under the impression, as he told the writer,

that the rods were not strong enough. An explanation of the difficulty did not find him open to conviction, he seeming to think it none of the writer's business, in which the writer was compelled to agree with him, and the bridge still stands—if it has not fallen—inviting disaster.

After giving such specimens of distinguished incapacity, it is like stepping from the sublime to the ridiculous to mention an amusing display of modest ignorance on a little stringer bridge in southern Ohio. Some pathmaster or highway commissioner, with an eye to the beautiful, had cut away the lower side of the stringers in a graceful curve which diminished the depth of the stick in the middle by several inches, with the view, apparently, of imitating an arch or the camber of a truss. It is not probable, however, that this man regarded himself as a scientific bridge-builder, though he at least displayed some aptitude for the profession by keeping on the safe side.

W.

## The Litchfield Car Works.

LITCHFIELD, Ill., July 9, 1873.

## TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of July 5, your notice of the partial burning of our shops was nearly correct as to amount of loss and insurance, but as to our capacity for work you hardly do us justice. We are turning out 150 box cars per month, besides our work in cabooses, hand-cars and push-cars, of which we were filling several contracts. I am happy to be able to state that we are making rapid progress in the work of rebuilding, and that we expect to be in full operation by the first of August. All our contracts will be promptly filled without any more delay than the actual time consumed in rebuilding.

W. E. BACON, Secretary.

## The St. Louis Regulations Concerning Ticket Sales.

At a convention of the railroad lines terminal at St. Louis or East St. Louis, held at St. Louis, on Thursday, September 14, 1871, the following agreement was entered into, each railroad represented pledging to the others its good faith for the faithful maintenance and observance of the same:

"The several railway companies whose lines run to St. Louis or East St. Louis, in order to diminish the cost of their passenger business at St. Louis, prevent unnecessary cutting of passenger rates, and to reform the service in said city from abuses which render it odious to the public and unprofitable to the railways, hereby agree each with the other, this agreement to take effect on the first day of October, A. D. 1871.

"First—That each railway company may maintain in the city of St. Louis one office where tickets are sold over its line and connections, and may also sell tickets at its regular ticket office in its passenger depot in St. Louis or East St. Louis. Each company agrees that it will have or permit its tickets sold at no other offices or places in St. Louis; will furnish tickets to no persons, officers or otherwise, in St. Louis or East St. Louis except the two hereinbefore specified; that it will not permit its tickets to be sold by other parties than at the two offices specified; that it will pay no commission whatever to any one for selling tickets in St. Louis or East St. Louis over its line or connections; that it will not permit its connecting lines to pay commissions for tickets sold over any of the respective roads of the parties to this agreement, upon tickets from St. Louis or East St. Louis, and agrees to promptly discharge any employee or officer, no matter what his rank or position, who violates this agreement, or knowingly permits it to be violated when in his power to prevent it.

"Second—That all runners, solicitors, scalpers, curb-stone men, drummers and outside passenger men, of all kinds, shall be discharged on or before the day this agreement takes effect, except that each company may retain one man for the purpose of posting advertising matter in St. Louis or East St. Louis, but he shall not be permitted to solicit passengers at any railroad station, on the curb-stone, or elsewhere.

"Third—Each company for itself agrees that it will not permit its connecting roads to employ solicitors, or other passenger men in St. Louis or East St. Louis, to work for business over its line; but its officers will do all in their power to carry out this agreement in good faith with each other and all other lines, who are parties hereto, and to compel its faithful observance.

"Fourth—In case of a "combination," when this agreement takes effect, among or by the outside ticket men in St. Louis or East St. Louis, to turn business upon any one or more lines leading from St. Louis or East St. Louis, it is hereby agreed that the line or lines in whose favor such combination is working shall divide the excess that is received on account of such combination with the other competing lines, upon such terms as may be agreed upon by the presidents of the respective companies herein represented.

"Fifth—That any railroad whatever terminating in St. Louis or East St. Louis, or not—but whose trains run to St. Louis or East St. Louis, issuing its own tickets, running its own cars, and controlling the time of its trains, shall have the right to open an office in St. Louis for the sale of tickets over its own road and connections.

"Sixth—On or before the date that this agreement takes effect, all coupon tickets shall contain the words, "Not good if detached," or words to that effect, and no signature shall appear on such coupons. It is further agreed that unless such coupons are presented attached to the contract ticket, they will not be honored for passage."

This agreement was signed by an authorized officer for each company having a terminus in St. Louis, viz., the North Missouri, Missouri Pacific, Atlantic & Pacific, St. Louis & Iron Mountain, St. Louis, Alton & Terre Haute, St. Louis & South-eastern, Ohio & Mississippi, St. Louis, Vandalia, Terre Haute & Indianapolis, Indianapolis & St. Louis, Toledo, Wabash & Western, Illinois Central, Chicago & Alton, and Rockford, Rock Island & St. Louis. It was demanded by the frightful condition of the ticket business in St. Louis, where companies seemed to compete with each other in the percentages given as commissions to runners, etc., who were absorbing all the profits of the St. Louis passenger business.

This agreement, which has been more or less strictly adhered to, was amended at two different times, and at a meeting of the St. Louis lines on the 2d inst., it was ordered that the original agreement, together with the amendments subsequently adopted, be printed and distributed. These amendments are as follows:

## AMENDMENT ADOPTED APRIL 8, 1873.

"Article First. The paragraph reading 'that it will not permit its connecting lines to pay commissions for tickets sold

over any of the respective roads of the parties to this agreement upon tickets from St. Louis or East St. Louis,' to be changed to read 'that it will not permit its ticket agents, at St. Louis or East St. Louis, to receive commissions sold by them over any railroad line, and that it will not permit any railroad line to pay commission on tickets sold from those points.'

"Article Fourth shall be changed to read as follows: 'In case of a "combination" to destroy the force and effect of this agreement, among, or by the outside ticket men in St. Louis or East St. Louis, or by any road party to this agreement, or by any other road, to turn business upon any one or more lines leading from St. Louis or East St. Louis, it is hereby agreed that the lines in whose favor such combination is working shall divide the excess that is received on account of such combination with the other competing lines upon such terms as may be agreed upon by the presidents of the respective companies herein represented.'

"The following resolution was also adopted at this meeting: 'Resolved. That in the event of any of the roads withdrawing from the agreement of September 14, 1871, reaffirmed to-day, that all the roads, parties to that agreement, will refuse to issue or receive tickets or check baggage over the road withdrawing from said agreement, on notice from either referee; and that the President of the St. Louis, Vandalia, Terre Haute & Indianapolis, and the General Superintendent of the St. Louis, Kansas City & Northern Railway be appointed Referees, to arrange differences between the several roads, parties to this agreement—their decision to be final. The former to be Referee for all roads west of St. Louis, and the latter for all roads east of St. Louis.'

## AMENDMENT ADOPTED JULY 2, 1873.

"Resolved. As a part of the agreement between the lines terminal at St. Louis, that no omnibus tickets will be sold by any of said lines except they be issued by said lines, and consecutively numbered, and that no redemption of said omnibus tickets will be permitted. This to take effect July 10, 1873."

## CHICAGO RAILROAD NEWS.

## Chicago &amp; Paducah.

There remained, on Monday, July 14, only five miles of track to lay to join the two sections of this road now in process of building. The company expects to have trains running through from Streator to Windsor (12 miles west of Mattoon) by the 20th inst.

## Rock Island &amp; Pacific.

The new schedule of rates for freight on this road does not enable the company to compete with the Illinois & Michigan Canal, which runs parallel with and adjacent to the road for many miles. The General Freight Agent, Mr. Viele, is, therefore, engaged in a reconstruction of the freight schedule, so as to enable the company, so far as possible, to control at least a part of the grain transportation. Under the present tariff the road is threatened with an almost total loss of the grain business, for, between the canal and the east-and-west roads, there would be nothing left of any account. Mr. Viele thinks the new rates will be charged only on that part of the road which lies between Joliet and Rock Island, and these rates will be reduced just about one-third. The new schedule will be prepared in about ten days. This company makes no rebate for car loads, and some of the roads do.

## The New Freight Rates.

There is little talked about by any railroad officials in Chicago at present, except concerning the working of the Illinois railroad law and the operation of the new freight tariffs. Two weeks have passed since the new tariffs went into effect, and the first and most palpable results are a large falling off in freight business on the roads generally, which center in this city. This arises from two very apparent causes. First, for several weeks immediately preceding the 1st of July, the shipping of grain and lumber was stimulated beyond its normal state by the belief that the rates of transportation for those staples were more favorable under the old law than the new. Second, shippers have been withholding shipments in order to ascertain what the new rates would be. Inquiries have come in from all directions asking what the freight rates would be in a certain given case. The indications now are that the transportation of goods will recommence, and be as large in volume as before; but its current will be decidedly changed. Towns in the State of Illinois south of Chicago will largely—almost completely—sever their commercial relations with this city, and their business will be diverted to Toledo, Indianapolis, Cincinnati and St. Louis. Wholesale shippers in Chicago are beginning to see that this is inevitable and to raise their voices against the new law. In reality nobody seems to be satisfied with the law. The farmers find that instead of offering relief, it is really more burdensome, as it requires nearly everybody to pay more for the transportation of a hundred pounds of grain or merchandise than before.

The law, at present, seems destined to become universally unpopular. It was enacted to prevent what was considered by the people unjust discriminations, and it really operates in the interest of monopoly. It forbids practically certain railroads from entering into competition with other roads, while it enables roads differently situated to enter into the most active competition. For instance, the east-and-west roads that extend to Toledo and Cincinnati, having the larger part of their lines outside of Illinois, can cut down their through rates so as to take all the business, while the north-and-south roads, like the Illinois Central and the Chicago & Alton, will transport southward long trains of empty cars, simply because they are not allowed by the law to carry anything at specially low rates. It is beginning to be apparent, therefore, that the law, while it operates detrimentally upon north-and-south roads, will be of more benefit than injury to roads leading westward from this city, such as the Chicago, Burlington & Quincy and the Northwestern. In fact, it may be generally stated that the law injures all north-and-south roads, while it benefits all east-and-west roads. The law does not prevent competition. It simply says to a few railroad companies that they shall not compete; and so ultimately rules Chicago out of a large business, unless its shippers will forego a large portion of their profits in order to maintain it—a thing which they will not be very likely to do.

## Chicago &amp; Alton.

A special meeting of the stockholders has been called to be held September 10, at the office of the company in Chicago, to consider the question of issuing consolidated mortgage bonds to the amount of \$3,000,000. It is intended to set apart from that amount \$3,470,000 for the purpose of retiring and canceling a like amount of mortgage bonds now outstanding and falling due at different periods. Of the remaining \$1,530,000 of mortgage bonds it is designed to sell \$1,500,000 this year, the proceeds of which are to be applied to the construction of a bridge over the Mississippi River at Louisiana and to the purchase of steel rails and laying of a second track to meet the demands of the traffic. The remainder, it is stated, will be issued from time to time in the future, to provide means for the purchase of steel rails to take the place of worn-out iron rails and for additional rolling stock.

## Chicago &amp; Pacific.

Judge McAllister, of the Illinois Supreme Court, has issued an injunction prohibiting this company from taking possession of that portion of the right of way of the Chicago & Northwestern near Elgin, Ill., which was condemned for the Chicago & Pacific a short time since.





Published Every Saturday.

CONDUCTED BY

S. WRIGHT DUNNING AND M. N. FORNEY.

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## Editorial Announcements.

**Removals.**—The Chicago office of the RAILROAD GAZETTE has been removed to No. 77 Jackson street, opposite Third avenue. The New York office of the RAILROAD GAZETTE is removed to Room 131, No. 73 Broadway, opposite the upper elevator landing.

**Correspondence.**—We cordially invite the co-operation of the railroad public in affording us the material for a thorough and worthy railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

**Inventions.**—No charge is made for publishing descriptions of what we consider important and interesting improvements in railroad machinery, rolling stock, etc.; but when engravings are necessary the inventor must supply them.

**Articles.**—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

## THE PROPOSED MEXICAN RAILROAD SYSTEM.

The Mexican International Railroad Company, according to a communication made to the Mexican Minister of Public Works by Mr. Edward Lee Plumb, May 17, in its proposals to and contract with the Mexican Government, is supported by the following railroad companies, who have associated together in joint interest: The International Railroad Company of Texas, the Houston & Great Northern Railroad Company, the Missouri, Kansas & Texas Railway Company, the Cairo & Fulton Railroad Company and the St. Louis & Iron Mountain Railroad Company.

These companies have now completed about 1,550 miles of railroad, which by the completion of the Cairo & Fulton within a few months will be increased to more than 1,600 miles. These lines have northern termini at Cairo, Ill., St. Louis and Hannibal, Mo., and Junction City, Kan. From St. Louis or Cairo the line will be quite straight nearly due southwest to the interior of Mexico at Lagos, whence a turn at nearly right angles will be made southeastward to reach the city of Mexico. By this route, however, there will be a break of gauge at the border between Arkansas and Texas, the St. Louis & Iron Mountain and the Cairo & Fulton having the 5-feet gauge, while all the other lines have the standard gauge of 4 ft. 8½ in. It will be difficult, for a long time at least, to change this gauge, as the connections of the St. Louis & Iron Mountain east of the Mississippi and south of the Ohio are of very great importance and all of the 5-feet gauge. The distance by this route to the junction of the International of Texas with the Houston & Texas Central, which will be the point of divergence for traffic going over the Missouri, Kansas & Texas, unless that company completes an extension from the Red River southwestward, which it talks of doing, will be:

Hearne to St. Louis, via International, Cairo & Fulton and St. Louis & Iron Mountain, 742 miles; Hearne to St. Louis via Houston & Texas Central, Missouri, Kansas & Texas, and Atlantic & Pacific, 803 miles; Hearne to Chicago via International, Cairo & Fulton, Cairo, Arkansas & Texas and Illinois Central, 1,012 miles;

Hearne to Chicago via the first named route to St. Louis, and thence by Chicago & Alton, 1,023 miles; Hearne to Chicago via Houston & Texas Central, Missouri, Kansas & Texas (via Sedalia and Moberly to Hannibal), and Chicago, Burlington & Quincy, 1,066 miles. The Cairo route will be shorter to Indianapolis and points east of it by just 60 miles than the shortest St. Louis route, the distance from Indianapolis to Hearne being 920 miles.

The distances from Hearne southwestward are estimated, no location having been made of any considerable part of the line, and no surveys of any kind of most of it in Mexico. The part to be built in Texas from Hearne to the Rio Grande will be about 300 miles long; the Mexican Company estimates the distance from the Rio Grande to Lagos at 604 miles, and from Lagos to the city of Mexico at 292 miles, which will give a distance of 1,196 miles from Hearne to the city of Mexico, to be added to the distances given above. But Lagos will probably be the center of the Mexican system proposed by the International Company, which will have many branches, and a line to the Pacific.

We have given only the distances to the points to which the lines in interest form routes, as it is probable that they will direct the business over their own lines so far as possible. But traffic to New Orleans will probably leave the International at Austin, if the New Orleans & Texas road is completed, and the Texas & Pacific and North Louisiana & Texas will form an outlet eastward which will be quite direct to the South Atlantic towns and as short as any, perhaps, to New York and the Northeast, while at Little Rock another pretty direct eastern route will connect.

We do not imagine, however, that there will be, for a long time at least, a heavy traffic over the line to the Texas frontier, and there need be no very bitter strife over dividing it among different lines. By far the most promising part of the system is that within four or five hundred miles of the city of Mexico, where there is a large population and many considerable cities whose exchanges heretofore have been almost exclusively with each other and very little with the United States. Mexico imports little heavy freight except iron, and exports little but valuable articles of little weight compared with their value, and, moreover, no heavy freight—like grain, for instance, or even sugar—is likely to choose a rail route 2,000 miles long or more to market, when by 200 miles or so of rail and a quite direct ocean route it can reach the same or equally good markets. But the line required to connect the profitable parts of the Mexican roads with the profitable Texas line will not be very long, and there ought soon to be, if not from the first, sufficient traffic in passengers and merchandise to support it, especially as it is likely to have no competition for such traffic. When a convenient channel has once been opened the traffic may grow rapidly, as a large part of the country is, doubtless, capable of producing many things much in demand in the United States, while we may some day be able to manufacture for export.

An examination of the contract made by the International Company with the Mexican government (which contract is yet to be ratified by a Congress to be elected this summer, which ratification the Mexican newspapers seem to think almost beyond question) shows that the company is to receive a subsidy of \$9,000 per kilometer (about \$14,500 per mile) for all the lines constructed, limited to 2,621 kilometers, beginning when it shall have completed 100 kilometers (62.14 miles) of line from the city of Mexico towards the Pacific, and payable for successive sections of 20 kilometers thereafter, in obligations bearing no interest, to be termed "construction certificates of the Mexican International Railroad," which are to be the only currency received for 8 per cent. of all duties on imports at eight of the leading custom-houses, including that at Vera Cruz. In addition to this subsidy, the International Company is to receive a premium if it completes the line to the Pacific and that to the Rio Grande in less than the stipulated term of ten years from the completion of the contract. If the lines are completed in one year less than this term, the premium will be \$100,000; if in two years less, \$200,000 for each year; if in three years less, \$300,000 for each year, and if in four years less, \$400,000 for each year, the premium to be in "construction certificates," like those in which the subsidy is payable.

If, then, the company should construct the entire contemplated system of 2,621 kilometers (1,630 miles) and 1,951 kilometers of it (1,214 miles) within six years from the approval of the contract by Congress—which ought not to be a very difficult task for a company with sufficient capital—it would receive in subsidies and premiums \$25,189,000 in these certificates, which the merchants of the country would absorb entirely in paying duties to the amount of \$314,682,500. A further valuable privilege is the admission of all materials and stores for the construction and working of the

railroad free of duty for fifteen years, while the property of the company will be exempt from taxation for fifty years. The whole subsidy, should the roads to the Pacific and the Rio Grande be completed in the shortest period, would be about \$15,450 per mile of road. If it should construct only the 1,214 miles from Mexico to the Pacific and from Lagos to the Rio Grande within six years, and construct none of the branches, it would have received in premiums and subsidies \$12,490,000, and, apparently, be liable to no other penalty than the forfeiture of the bond for \$400,000, which it must give on completing the contract. This would leave a subsidy at the rate of about \$15,460 per mile—almost identically the same rate as if the whole system were completed. But there is not much likelihood that any company would willingly give up the construction of most of the proposed branches, as they are for the most part lines to considerable cities, and through country likely to afford the largest traffic in Mexico.

Among the conditions of the contract is one stipulating maximum rates for transporting passengers and freight. According to this, the rate per ton per kilometer must not be more than 7 cents for first-class, 5 cents for second-class, and 2½ cents for third-class freight, and grain must be included in the third-class. This is equivalent to 11½, 8 and 4 cents per ton per mile respectively. For passengers the charges are limited to 4 cents for first-class and 2½ cents for second-class per kilometer, or 6½ cents and 4 cents per mile.

If the country over which the proposed lines are to be constructed was similar in character to that through which the Mexico & Vera Cruz line has been constructed, such a subsidy would be of little value. But we understand that but little of the country offers any formidable difficulties, and that nothing more difficult than the work on the Union Pacific is anticipated anywhere, while for most of the mileage construction will be as easy as in most of our States outside the prairie districts. The privilege of free importations ought to make up for all cost of transportation and much of the extra cost of skilled labor in Mexico, so that many of these Mexican lines might cost little, if any, more than a line in New York or Ohio. Doubtless a cash subsidy of \$15,000 a mile or so would insure the construction of a road anywhere in the United States where there is a prospect of a line's paying a small interest on its cost within five or six years; and doubtless any part of the United States as thickly peopled as most of the country on the proposed new line in Mexico, and entirely devoid of railroads and water routes, would have no need of offering subsidies to secure railroads; the traffic would be a sufficient inducement. But "construction certificates" are not cash, though they may become worth nearly or quite as much as specie, and Mexico is not the United States, and we cannot assume that a given population in the former country will afford as much, or anything like as much, traffic as an equal population in the United States. If it would, the International Company would have a contract of extraordinary value, for the roads would pay a good income on the investment from the very start, and the subsidy would be clear profit; but with the difficulties and uncertainties existing, it may have only a fairly promising one. The lines which it purposes to construct ought, however, to be of exceedingly great value to Mexico, if its people can in any way be induced to profit by them. Not only will they enable that fertile country to produce profitably for export, but if well worked and once put in operation systematically, the government, with a comparatively small army that can be trusted, may effectively maintain order throughout the populous States, which is the very first requisite to the production and accumulation of wealth in Mexico.

## UNITED STATES RAILROAD STATISTICS.

Under this head we have reproduced from Poor's Manual for 1873-74 some tables which are well worthy of study and preservation. It is not probable that they are accurate, or that they do not contain many considerable errors, but they are doubtless the best that we have, better than any we have had heretofore, and perhaps as good as can be made with the existing sources of information. In the tables of cost, earnings, etc., the division by States was very roughly made by the compiler, who has made no division of the earnings, etc., of roads which come in more than one State, "the roads being usually assigned to those States in which the greater portion of the line is found," a principle which brings the Chicago & Northwestern, with about 465 miles in Illinois, 417 miles in Wisconsin, 425 miles in Iowa and 154 miles in Michigan, all in Illinois, and which, doubtless, decreases the average earnings per mile of Illinois roads to the advantage of other States.

The statistics of construction for the year are apparently based on mileage opened for business, and not on the mileage of track laid—an interval of many months often intervening between the laying of the rails and the open-



ing of the road for business—as we see in the case of the Canada Southern, on most of which track was laid in 1872, but which has but just been opened for business. At least we are able to certify that the Manual's figures are not accurate for the mileage of new track laid in 1871 and 1872. We gave for those years detailed statements for every line in the country, which we have since found to be very nearly correct. We found 7,364 miles laid in 1872, and 7,222 miles in 1871. Poor's Manual gives 6,427 miles for 1872, and 7,779 for 1871, the aggregate being 14,586 miles by our figures, and 14,206 by the Manual's. Mileage brought into operation, however, is a very different thing from track laid. The figures for annual increase of mileage are different in this volume, for all the years after 1864, from those given in preceding volumes of the Manual, the last having given 7,453 for the mileage of 1871, against 7,779 in this. The lower table of those we have copied from the Manual is, however, much the most important, and as it is made from the reports of the companies, either to the stockholders or to State officials, it is doubtless substantially accurate, except in the matter of distribution according to States, to which we have called attention. The results are well worth studying, and we can make but few condensations here more striking than the statements of the table itself. The footings of the columns give the condition of the railroads of the country in a nut-shell. These show that in States and Territories with an area of 2,492,316 square miles and a population of 40,232,000, we had, at the close of 1872, 67,104 miles of railroad in operation (reports from 57,323 miles being given), or one mile of railroad to 37.1 square miles of area and 599 inhabitants. The companies owning the 57,323 miles of road reported had an aggregate capital stock of \$1,647,844,113, and a funded and other debt amounting to \$1,511,578,944, the total capital account being \$3,159,423,057, or \$55,116 per mile.

The gross earnings of these 57,323 miles of railroad were \$473,241,055, 28 per cent. of which was from passengers, and 72 per cent. from freight, etc. This was 15 per cent. on the capital account, at the rate of \$8,256 per mile, and \$11.76 per each inhabitant of the country. The working expenses were \$307,486,682, or 65 per cent. of the receipts, leaving as net earnings \$165,754,373, which is 5.2 per cent. on the entire capital account. The gross sum paid in dividends was \$64,418,151, equivalent to 3.91 per cent. on the entire capital stock, and, we will add, to just \$1.60 for each man, woman and child in the United States.

With these tables, in the introduction to the Manual, Mr. Poor gives a tabular statement for 436 different companies, arranged alphabetically, by States, which gives for each road mileage of main and branch lines, mileage of all other tracks, number of locomotives, number of passenger train cars and of freight train cars, capital stock, funded debt, floating debt, cost of road and equipment, train mileage for last year reported, number of passengers and of tons of freight carried, earnings from passengers, from freight and from other sources, net earnings and rate of dividends.

In this tabular statement of Mr. Poor, covering 436 different companies, with an aggregate of 57,323 miles of railroad, we find that 135—less than one-third—paid dividends varying from 1 to 15 per cent. We have compiled a table, showing the number of companies and the aggregate length of line paying each dividend. This shows that one company, with 12 miles of road, paid 15 per cent.; four companies, with 243 miles of road, paid 12 per cent.; one, with 141 miles, paid 11 per cent.; thirty, with 4,568 miles, paid 10 per cent.; six, with 1,117 miles, paid 9 per cent.; twenty-two, with 4,736 miles, paid 8 per cent.; one, with 122 miles, paid 7½ per cent.; eighteen, with 6,206 miles, paid 7 per cent.; two, with 266 miles, paid 6½ per cent.; twenty, with 1,971 miles, paid 6 per cent.; six, with 284 miles, paid 5 per cent.; five, with 440 miles, paid 4 per cent.; one, with 98½ miles, paid 3½ per cent.; one, with 121 miles, paid 3.05 per cent.; one, with 67 miles, paid 2½ per cent.; five, with 760 miles, paid 2 per cent.; two, with 330 miles, paid 1½ per cent., and one, with 53 miles, paid 1 per cent. That is, out of a mileage of 57,323, dividends of some kind were earned by 22,731 miles, or a little less than 40 per cent. The dividends earned by six-sevenths of this mileage were from 6 to 10 per cent. Less than one-fiftieth of this mileage earned higher dividends, and one-eighth of it earned lower ones.

Making a compact and easily remembered statement for the whole United States, we deduce these figures for the average mile of railroad:

Capital account per mile.....	\$55,116
Capital stock per mile.....	28,743
Debt per mile.....	26,373
Gross receipts (15 per cent. on capital).....	8,256
Net earnings (5.2 per cent. on capital).....	2,890
Working expenses (65 per cent. of receipts).....	5,366
Average dividends (3.91 per cent.).....	1,124

The newer lines, not covered by the reports, would

doubtless be very much below the average in earnings, probably somewhat below them in capital accounts, and probably altogether without dividends. The statement above may be taken to cover lines that have got fairly to working.

#### Record of New Railroad Construction.

The number of the RAILROAD GAZETTE for last week had information of the laying of track on new railroads as follows: *Atchison, Topeka & Santa Fe*.—Extended from Sargeant, on the line between Kansas and Colorado, westward 12 miles to Grenada, Colorado. *Middlesex*.—Completed from Lexington west 6 miles to Concord, Mass. *International & Great Northern—Great Northern Division*.—Extended from the Sabine River northward 3 miles to a junction with the Texas & Pacific at Mineola, Texas.

This is a total of 21 miles of new railroad.

This number of the RAILROAD GAZETTE has information of the laying of track on new railroads as follows:

*Rochester & Pine Creek*.—Track laid from the junction with the Buffalo Division of the Erie Railway at Gainesville northeastward 6 miles to Perry, N. Y. *Utica & Black River—Cathage & Clayton Division*.—Extended from Theresa westward 10 miles to Lafargeville, N. Y. *Texas & Pacific*.—Extended from Lake Fork west 10 miles to Mineola, Texas, the junction with the Houston & Great Northern; on the *Jefferson Division* track has been laid from Marshall north 16 miles to Jefferson, Texas. *Northwestern Union*.—Extended on the northern section from Kewaskum southeast 7 miles to West Bend, and on the southern section northward 15 miles to Germantown, 15 miles from Milwaukee—in all 22 miles. *New York & Oswego Midland*.—The main line is completed by the laying of track on a section 18 miles long, chiefly in Delaware County, New York. *Chicago & Paducah*.—Extensions have been made on the southern end of the northern section and the northern end of the southern section amounting altogether to 20 miles. *Rockford, Rock Island & St. Louis*.—A branch from Orion north 7½ miles to Minersville, Ill., has been completed.

This is a total of 109½ miles of new railroad.

THE AMERICAN INSTITUTE will hold its forty-second annual exhibition at the building on Third avenue and between Sixth and Sixth-and-a-half streets, New York, beginning September 10 and closing November 15. The buildings on Second avenue will be open for the reception of machinery August 18, the other buildings September 1. The "Department of Intercommunication," which will be most interesting to most of our readers, will be in charge of a committee consisting of Walter Shriver and William H. Godney; that of "Engines and Machinery," of one composed of Prof. R. H. Thurston, Robert Weir and Walter Shriver. The first group of the "Department of Intercommunication" embraces "locomotive engines, cars, or models of the same, and all apparatus and prepared material used in constructing and operating railroads; models of railway bridges, &c.; all fixtures, furniture and appliances used on passenger and freight railway cars." The second group covers vehicles and materials for common roads; the third navigation and its appliances; the fourth telegraph, signal and alarm contrivances, methods of conveying mails, packages, etc.

The exhibitions of the Institute always attract considerable attention, and are visited by a great many people from places outside of the city, and it ought to be worth while to exhibit railroad machinery and supplies there. Goods may be sent and shown unaccompanied by the exhibitor, on terms which may be ascertained by addressing the General Superintendent American Institute, New York.

MR. WASHINGTON ROEBLING, who is now in Europe, has sent us a letter in answer to some statements made by Capt. James B. Eads, in his letter which we published May 10. It arrived too late to appear this week, but will be published in our next.

#### Train Accidents in June.

On the 1st, near Myerstown, Pa., on the Lehigh Valley Railroad, an east-bound stock train struck a cow, which caught under the tender, twisted it around and caused the tearing up of the track for more than 250 yards, it is reported.

On the night of the 1st, near Iola, Kan., on the Leavenworth, Lawrence & Galveston Railroad, an express train while running northward with the engine backward ran over a Texas steer, by which the locomotive was thrown into the ditch. The engine could not run through on account of a washout, and was compelled to back for want of a turn-table.

On the evening of the 2d, the engine of a train on the River Division of the Milwaukee & St. Paul Railway ran off the track near the St. Paul depot, delaying the train an hour.

On the night of the 2d, an open switch near the Joliet Iron and Steel Works, on the Chicago & Alton Railroad, caused the wrecking of the engine and 14 cars of a freight train and serious injuries to the engineer. The road was blocked six hours.

At two o'clock in the morning on the 3d the engine, baggage car and two coaches of an express train on the Great Western Railroad were thrown from the track by a misplaced switch at Copeland, Ont., injuring 25 passengers, most of them slightly. The switchman had set the switch for the siding to let in a freight train which, by the time-table, waited there for the express to pass it. He then lay down in the station to sleep, counting on being wakened by the noise of the freight train. That train, however, being late, was held by the train dispatcher at another station. The switchman was arrested.

On the morning of the 3d, near Plymouth, Ill., on the Chicago, Burlington & Quincy Railroad, the tender of a west-bound passenger train jumped the track, delaying the train about two hours. A rail-chair was found lying near, and as it appeared to have been run over, it is supposed to have caused the derailment.

On the morning of the 3d, three or four cars of a freight train on the New York Central & Hudson River Railroad ran off the track at Holly, N. Y.

On the morning of the 3d, about two miles from Washington, Cal., on the California Pacific Railroad, a sand train ran over a cow and two dump cars were thrown from the track.

On the 3d, at Lafayette, N. J., on the Sussex Railroad, a gravel train ran into some coal cars which had been left on the main track with no one to flag them.

On the afternoon of the 3d, the engine of a north-bound passenger train on the Madison Division of the Chicago & North-western Railway was thrown from the track by a misplaced switch at Alton, Wis.

On the afternoon of the 3d, a number of cars loaded with rails having been pushed up an inclined plane at the Lochiel Iron Works in Harrisburgh, Pa., the brakeman neglected to put on brakes to hold them there, and they started down the grade with considerable speed and struck the rear of a short train which had been standing on the siding a little further down, but had just started to get out of the way. Two cars were badly wrecked.

On the night of the 3d, as the east-bound passenger train on the Central Pacific Railroad was approaching Gold Run, Cal., an axle under the express car broke in two places, causing a delay of several hours to the train, but no serious damage.

On the 4th, at 7 a. m., a south-bound freight train on the Cincinnati, Hamilton & Indianapolis Railway ran into some cattle, which had caught into some trestle-work between Connersville and Rushville, Ind., by which the locomotive and tender and five cars were thrown from the track and down the bank, and the engineer was killed and the fireman and a brakeman severely injured.

On the 4th, seven cars on a south-bound freight train on the Canada Midland Railway, carrying a circus and menagerie, ran off the track, doing damage to the amount of \$10,000 to the property of the show, and fatally injuring two persons.

On the 4th, a freight train on the Concord Railroad ran off the track between Reed's Ferry and Merrimack, N. H., breaking up several cars.

On the night of the 4th, a west-bound freight train on the Erie Railway having stopped at the signal that the Hackensack River draw was open, a following freight train ran into it, wrecking the caboose and three freight cars, while the boiler of the following engine exploded.

About 6 o'clock on the morning of the 5th, the locomotive of a freight train bound east on the New Jersey Division of the New York & Oswego Midland Railroad jumped the track at the junction with the Pennsylvania Railroad at Marion, N. J., causing considerable delay to trains on both roads, but doing little damage.

On the morning of the 5th, on the Delaware Railroad near Wilmington, there was a collision between a construction train and a north-bound engine, destroying some cars, blocking the track some time, and slightly injuring the roadmaster, who had charge of the construction train.

On the afternoon of the 5th, a west-bound freight train on the Pacific Railroad of Missouri struck a car of sand which was standing on the track, knocked it on end and damaged some freight.

On the morning of the 6th, at Jonesville, Vt., on the Vermont Central Railroad, a locomotive, tender and car were thrown from the track by a misplaced switch, and rolled down a bank 30 feet high into the river, and four other cars were badly damaged. The fireman was slightly hurt.

On the 6th, at Franklin, N. J., on a switch of the Sussex Railroad, there was a collision between a milk train of that road and a New Jersey Midland freight train, by which the Midland engine was thrown from the track and badly damaged.

On the afternoon of the 6th, a passenger train of the Milwaukee & St. Paul Railway struck a freight car which had been left on a siding under the Madison street viaduct in Chicago too close to the main track, breaking all the windows on one side of the coach.

On the 7th, a little east of Sandusky, O., on the Lake Shore & Michigan Southern Railway, there was a collision between an east-bound freight and a west-bound gravel train, by which one workman was killed and fireman was injured, both engines were badly damaged, four flats and four stock cars were destroyed, a car-load of sheep and 17 cattle were killed. The conductor and engineer of the freight had neglected to read an order which they had received and signed, which order directed them to wait for the gravel train.

On the afternoon of the 7th, a bridge over the Marais des Cygnes, on the Leavenworth, Lawrence & Galveston Railroad, gave way under a wrecking train, and both train and bridge were badly wrecked. Five men were more or less injured. It is said that the bridge had been rebuilt within a year and critically examined a few days before the accident. It was a single span, 130 feet long, and 30 feet above the water. There had been freshets shortly before.

On the morning of the 8th, a mile north of Broadway, Va. (13 miles north of Harrisonburg), on the Manassas Division of the Washington City, Virginia Midland & Great Southern Railroad, a north-bound freight train struck a rock which fell upon the track a few feet in front of the engine, turning the locomotive across the track on the edge of the embankment in a badly wrecked condition. The engineer saw the rock fall, reversed, stuck to his engine, and, with his fireman, was injured. Four cars were broken up.

On the 8th, as a west-bound passenger train on the Union Pacific Railroad was passing over the trestle work of the east approach to Elkhorn Bridge, the trestle gave way (having been undermined by recent floods) and the locomotive, mail car, express car, baggage car, and a car loaded with young fish for stocking California waters went through into the water, and a roadmaster, who was riding on the engine, was drowned.

On the afternoon of the 8th, an east-bound freight train on the New York Central & Hudson River Railroad was thrown from the track by a misplaced switch at Byron, N. Y., and the engineer was severely injured.

On the 9th, about noon, an east-bound coal train on the New York Central & Hudson River Railroad, while attempting to take a siding in order to clear the main track for an express then nearly due, broke in two, leaving the section broken off on the main track in a cut. A flagman was sent back who was seen from the express when within about a quarter of a mile; but though brakes were sprung and the engine reversed the speed was not slackened sufficiently to prevent a collision, by which the caboose was utterly demolished, two coal cars wrecked, and the express engine swung diagonally across both tracks, with two drivers broken off and otherwise damaged. The engineer stuck faithfully to his engine and was unhurt. The fireman was thrown from the cab and slightly hurt. The tracks were blocked about three hours.

Early in the morning of the 11th, an engine ran off the track of the Erie Railway, near the freight-house in Buffalo, struck a small frame house, carried it about 30 feet, and demolished it.

On the morning of the 11th, near Locust Gap, Pa., on the Union Hill & East Mahanoy Railroad, a locomotive and four freight cars were thrown from the track, and badly broken up.

On the morning of the 11th, at Ridgeway, Pa., on the Philadelphia & Erie Railway, as a west-bound freight train was passing the station at a rapid rate, one of the journals of the front car gave way—"melted off," a local journal says—and the truck caught in a switch bar at a curve, threw the switch open, and nine cars went off, three of them down the bank into Elk Creek.

About noon on the 11th, a journal broke under a coach in a north-bound passenger train on the New York Central & Hudson River Railroad, near Cold Spring, N. Y., causing the coach to leave the track. It was so dragged some distance, and both tracks were blocked for a time. One passenger was injured. The journal-box was found to be on fire an hour or more before, and was cooled with water.

On the afternoon of the 11th, at East Newark, N. J., there was a collision between a west-bound passenger train, on a loop



line, and an east-bound freight train, on the main line of the New York division of the Pennsylvania Railroad, at the junction of the two lines, by which both engines were wrecked, the baggage car was telescoped into the smoking car, and two freight cars were destroyed. The engineer of the passenger train was fatally injured, and the conductor, fireman, baggage-master, the engine-man of the freight train, and six passengers were injured.

On the afternoon of the 14th, a south-bound freight train on the Philadelphia & Reading Railroad came into collision with some coal cars, which were being transferred from a siding to the main track at Mine Hill crossing, near Schuylkill Haven, wrecking several cars, throwing one freight car into the Schuylkill, and blocking the track two hours.

On the morning of the 12th, about two o'clock, at Woodstock, Ohio, on the Columbus & Indianapolis line of the Pittsburgh, Cincinnati & St. Louis Railway, an east-bound express ran at the rate of thirty miles an hour into an open switch, which had no connection with the main track at the other end. Several cars were turned over, and one passenger injured.

On the morning of the 12th, at Thomson Centre, Pa., on the Jefferson Branch of the Erie Railway, a party of track-men coupled their hand-truck to an east-bound engine to be moved up the track, and while running fast a wheel of the truck broke, and the platform upset, killing two men, and seriously injuring three others.

On the 12th, about 1 p. m., as a north-bound passenger train on the Iron Railroad had checked speed because of cattle in front, near Ironton, Ohio, a coal train following ran into the rear passenger car, and two passengers were severely and one slightly injured.

On the 12th as a coal-train engine was loading at a curve near Moss Bank, a mile west of Danville, Ill., on the Indianapolis, Bloomington & Western Railway, a heavy west-bound freight train ran into it with a shock that threw off three of the freight cars and brought the train to a halt. The fireman of the coal-train engine, seeing the freight approaching, reversed and jumped, and so this engine ran back at great speed across a bridge, with no one to control it, and struck a coal car which was standing on the track, which threw it partly from the track. The damage is estimated at \$5,000.

Shortly after midnight on the morning of the 13th the engine of an east-bound passenger train on the New York Division of the Pennsylvania Railroad was thrown from the track in the Bergen Cut, by running over a car-door which had fallen from a car of a preceding train. The engine ran over the ties about a hundred yards and then caught fast close to the track.

A west-bound engine and tender of the New Jersey Midland came backing along and struck the derailed engine. Both engines were badly wrecked, and also some coaches, and considerable delay was caused by the wrecks.

On the morning of the 13th, near Wall's, Pa., on the Pennsylvania Railroad, as an express train was approaching the station a coal train from the Oak Hill mines ran across the track so close in front that the express could not be prevented from running through the coal train, piling up the coal cars on both sides of the track and tumbling the coal train engine down the bank into Turtle Creek, and disabling the express engine.

On the morning of the 13th, as two engines were drawing a heavy train on the West Reading Railroad, one of the engines left the track and was upset, scalding the engine-man.

On the 13th, near Calicoon, N. Y., on the Erie Railway, a passenger train broke in two, and the rear part, with some heavy sleeping cars, ran into the forward part with such force as to injure two sleeping coaches badly and disable one of them. One passenger was injured.

On the night of the 13th, a little east of Narrowsburg, N. Y., on the Erie Railway, the locomotive and six cars of a freight train were thrown from the track by a broken journal, and the cars were badly wrecked.

On the night of the 13th, between Spencer and East Brookfield, Mass., on the Boston & Albany Railroad, there was a collision between two west-bound freight trains, by which damage was done estimated at \$30,000, and an engine-man was injured.

On the morning of the 14th, near Sutherland Falls, Vt., on the Rutland Railroad, an extra passenger train ran into and demolished a car loaded with sand, which some men were carelessly pushing along the track.

On the 14th, about two miles east of Kansas City, Mo., on the track of the Hannibal & St. Joseph Railroad, which is there used also by the St. Louis, Kansas City & Northern, an east-bound double train, one section with two engines and one with one, belonging to the Missouri, Kansas & Texas Railway, met in collision a west-bound train, and the four engines were badly wrecked, several stock cars broken up, and two engine-men and two firemen more or less injured. The damage to property has been reported at \$75,000.

On the afternoon of the 14th, a train on the Fox River Valley Branch of the Chicago, Burlington & Quincy Railroad was derailed at South Ottawa, Ill., owing, it is reported, to the spreading of the rails.

On the evening of the 14th, at Swede's Furnace, Pa., on the Philadelphia & Reading Railroad, a freight train ran into the rear of a coal train which was halted, breaking a number of cars and damaging the freight engine somewhat. The rear brakeman of the coal train, it is said, had left the train to get a drink of water, and so the following train was not signaled.

On the morning of the 15th, about five o'clock, a north-bound passenger train on the Norwich & Worcester Railroad, just after passing Dayville, Conn., encountered a plank, and five feet beyond it a tie which some one had placed across the track. The cow-catcher pushed the tie some distance until it struck a frog and became wedged between the rails at the end of a bridge over a brook. This threw the engine over the brook so that it half-buried itself on the other side of the brook, the tender and baggage car went over it, a second-class coach went down the bank and on its side, while a following coach remained on the bank, though it left the rails. The fireman was fatally and the engineer and brakeman severely injured.

About 5 o'clock in the morning on the 15th, there was a collision between two locomotives on the Atlantic & Great Western Railroad near the Forest street crossing in Cleveland, damaging both badly.

On the 15th, near Bakewell, Mo., on the St. Louis & Iron Mountain Railroad, a freight train while backing struck a yoke of oxen, throwing engine and tender from the track and blocking the road six hours.

On the night of the 15th, near the Woburn water station on the Boston & Lowell Railroad, a cattle train ran into the rear of an ice train, which was standing on the track, tumbling off fifteen or twenty cars and breaking 31 draw-bars in the ice train.

About half-past nine on the morning of the 16th, on the Montclair Division of the New York & Oswego Midland Railroad, the east-bound "Ulster County express" was thrown from the track near Bloomfield, N. J., and the rear passenger coach was badly damaged, but no one was seriously hurt.

On the afternoon of the 17th, at the Jamestown & Franklin crossing of the Atlantic & Great Western Railroad, a west-bound express on the Atlantic & Great Western ran into an oil train on the Jamestown & Franklin, destroying many cars (some of them burned) of the oil train, and breaking up the express engine. The flagman at the crossing is charged with neglecting to flag the express.

On the 18th, between Neely and Bluffs, Ill., on the Toledo, Wabash & Western Railway, as a sand train was running westward over a crooked road and on a down grade, on the time of another train which it was intended to guard against by flagging ahead, it struck an east-bound extra engine, having

neglected to put out a flagman, but having him on the engine at the time.

On the afternoon of the 18th, a north-bound freight train on the Illinois Central Railroad ran into an Indianapolis, Bloomington & Western freight train at the crossing in Bloomington, Ill., damaging the Central engine and breaking up several cars of grain on the other road. It is reported that the Illinois Central stopped before the crossing, saw one freight train cross its track, and that the other freight which was wrecked at the crossing, did not stop, as the rules require.

On the evening of the 18th, the engine of a passenger train on the Philadelphia & Reading Railroad was thrown from the track by a misplaced switch, while approaching the Pottsville depot at a low speed.

On the night of the 18th, 53 freight cars were backed into a switch of the Central Pacific Railroad at Sacramento with such speed that the caboose and three cars went through the end of the switch and struck a post of a freight shed with such force as to knock it down and do some damage to the caboose.

On the morning of the 19th, between Mason and Delhi, Mich., on the Jackson, Lansing & Saginaw Railroad, the rear end of the baggage car of a passenger train was thrown from the track by a stick of wood, and in this condition it was dragged nearly 60 rods and over a culvert. How the stick got upon the track is not reported.

On the 19th, two miles west of Caseyville, Ill., on the Ohio & Mississippi Railroad, the tender, baggage car, express car and one coach of a passenger train were thrown from the track by running over some cattle, blocking the road two hours and a half.

On the night of the 19th, as an east-bound express over the Cumberland Valley Railroad was approaching Bridgeport, Pa., it ran over a cow, which caught under a baggage car and threw from the track its rear truck and the front truck of the following passenger train, breaking them apart, and causing the passenger car to run into a bank, delaying the train two hours.

On the 20th, near Peosta, Iowa, on the Iowa Division of the Illinois Central Railroad, an extra train consisting of an engine and caboose car ran into a hand-car of some trackmen which was carrying two men and two rails. The pilot raised the rear of the hand-car and tipped the rails so that their front ends caught the ties and the other ends went, one through a cylinder and the other through the boiler. It is reported that the train preceding the extra had no flag to indicate that it was followed.

On the 20th, a north-bound passenger train on the Dutchess & Columbia Division of the New York, Boston & Montreal Railroad was thrown from the track by a misplaced switch at Fishkill, N. Y., blocking the road several hours.

On the 20th, at the station of the Chicago, Rock Island & Pacific Railroad in La Salle, Ill., there was a collision between a west-bound extra freight train and an east-bound express, breaking the pilots of both engines, throwing some of the trucks from the track, and delaying both trains about an hour.

On the night of the 21st, as a freight train on the Delaware Railroad was crossing the bridge over the Christians River, the connecting pole between two lumber trucks broke, and one end fell down and caught in the ties, tearing up the track for 70 feet, and tumbling two flats loaded with timber into the river.

On the night of the 21st, a freight train on the Central Railroad of New Jersey broke in two near Danellen, N. J., and the rear section gaining some speed on a down grade ran into the first section, breaking up two cars.

On the 22d, as a passenger train of the New Jersey Midland Railroad was approaching the Jersey City depot, the engineer found that he could not shut off steam, the lever sticking fast. The cars were cut off, but the engine went on and came into collision with a Pennsylvania Railroad engine, by which both were badly damaged. It was found that a nut was loose and had slipped from its place so as to hold the lever fast.

On the 22d, on the Midland Pacific Railroad 16 miles west of Nebraska City, Neb., four passenger cars went into the ditch where the road had been washed away.

On the afternoon of the 23d, on the Pacific Railroad of Missouri about 25 miles west of St. Louis, as a long excursion train was standing on the main track and taking on its passengers, another excursion train, which came from a point a mile further west, ran into its rear, wrecking two baggage cars which formed the tail of the train, and badly damaging the rear coach, while the engine of the moving train was much damaged and two of its coaches rolled down the bank. The accident is charged to the neglect of a brakeman to flag the rear train. He started back, but hearing the whistle for off-brakes sounded three times in succession, took it to be the six whistles calling him back. Nineteen persons were injured, two seriously.

On the night of the 23d, on the Chesapeake & Ohio Railroad near Richmond, Va., a new sleeping coach of a west-bound express train was thrown from the track, down a bank, turned over and badly broken up, injuring six passengers. The train was running east at the time.

On the afternoon of the 23d, an east-bound express train on the New York Central & Hudson River Railroad ran into a freight train that was standing on a siding a mile west of Schenectady, destroying several freight cars and the passenger engine, and killing one brakeman and severely injuring another who were in the caboose. A misplaced switch was the cause.

On the 24th there was a butting collision between the engines of two trains near the station in New Haven, Conn., by which a brakeman was severely injured.

On the 25th, a south-bound freight train on the New London Northern Railroad ran off the track near Belchertown, Mass. Six cars were broken up. The accident was caused by the defective condition of the track.

On the evening of the 25th, at Moundville, W. Va., on the Baltimore & Ohio Railroad, the tender, baggage car and smoking car of a fast express train jumped the track when opposite a freight house, tearing to pieces the platform of the freight house and injuring the cars badly.

On the night of the 25th, on the Iowa division of the Illinois Central Railroad, near Farley, Iowa, the locomotive and six cars of a west-bound freight train went off the track at a place where some one had removed a rail, the engine going over on its side, and the cars piling on top of it. The engine-man and fireman were killed.

On the night of the 25th, a freight train ran off the track of the Vermont Central Railroad, at South Vernon, Vt., blocking the road an hour.

On the morning of the 26th, near Edgerton, Wis., on the Milwaukee & St. Paul Railway, fourteen cars of a freight train were derailed at a place where a culvert had been washed away by a flood of the night previous.

About six o'clock on the evening of the 26th, as a south-bound passenger train on the New York Division of the Pennsylvania Railroad was approaching Meadow Turnout, a parallel road on the line, No. 742, broke, one end carrying away the running board and wrecking one side of the cab, and the other breaking a number of ties. Trains were delayed for some time.

About eight o'clock on the evening of the 26th, an eastern-bound freight train on the Erie Railway, ran over a horse and rider near Ramapo, N. Y., and the horse was killed and thrown on the track. The engine passed over the horse safely, but four cars were thrown from the track, two of them going down the bank and two on to the up track. The man was not seriously injured.

On the morning of the 27th, at Port Jervis, N. Y., on the Erie Railway, the boiler of a switching engine exploded near the depot, injuring the engine-man and fireman, and throwing fragments over four squares of the town, demolishing a house close by. The engine had been out of the shop but a short

time, was thought to be in good repair, and is said to have been carrying but 100 pounds of steam at the time. An unknown defect in the boiler is supposed to have been the cause.

Very early on the morning of the 28th, a west-bound express train on the Chicago, Burlington & Quincy Railroad ran into a pile of boulders which some one had placed on the track a mile east of Meridan, Ill., one of which went through the grate and into the fire-box, without further injury.

On the morning of the 28th, near the corner of Western avenue and Fulton street, Chicago, there was a collision between an incoming passenger train of the Chicago, Danville & Vincennes Railroad and four cars backed by a Chicago & North-western engine which were moving down one arm of a Y to go down the road the other train was coming up. Three of the freight cars and the freight engine were badly damaged, and the baggage car of the passenger train was thrown on one side.

Near one in the afternoon of the 28th, at Plano, Ill., a west-bound express train on the Chicago, Burlington & Quincy Railroad was thrown from the track by a misplaced switch. It is supposed that the switch was turned maliciously, as it had been left locked but a little before.

On the 28th, at Durham, Mass., on the Boston & Maine Railroad, a freight train was thrown from the track, making a bad wreck and obstructing the road for some time.

On the afternoon of the 30th, in the yard of the Illinois Central Railroad at Dubuque, Iowa, as a west-bound freight train was starting out at a moderate speed, a coupling broke near the middle of the train. On being signaled, the engine-man reversed and began backing, but the force of the cars broken off was such that it broke the bumpers off from several cars, broke the draw-bars and stove in the ends of others, and tore the roof from one. A brakeman was slightly hurt.

On the night of the 30th, as a through train from Washington to New York was rounding the curve at the foot of Eutaw street in Baltimore, a coupling broke and five coaches left the track and were badly wrecked, and the track was torn up for some distance. One passenger was injured severely and three slightly.

Early in the month, at Big Sandy, Texas, on the Austin Branch of the Houston & Texas Central Railroad, as a passenger train was approaching a bridge, the track spread and the coaches all left the rails and were dragged to the bridge where they broke loose.

About the middle of the month an entire train on the Western Division of the Houston & Texas Central Railroad ran off the track about six miles west of Brenham, Texas, with little damage.

This is a total of 90 accidents, eight of which caused death, and 21 others personal injuries. The whole number of killed, was 12, and of wounded 104.

These accidents may be classified, as to their nature or causes as follows:

DERAILMENTS.	
Unexplained.....	14
Cattle on track.....	8
Misplaced switch.....	8
Accidental obstruction.....	3
Broken journal.....	3
Malicious obstruction.....	2
Spreading of rails.....	2
Failure of bridge or trestle.....	2
Wash-outs.....	2
Loose chair.....	1
Breaking of car-wheel.....	1
Breaking of pole connecting timber trucks.....	1
Defective track.....	1
Broken coupling.....	1
Rail maliciously removed.....	1
Switching too fast.....	1-51

COLLISIONS.	
Head collisions.....	6
Rear collisions.....	18
Crossing collisions.....	4
Unexplained.....	7-35
Broken axle (no derailment).....	1
Broken parallel rod.....	1
Boiler explosion.....	1
Engine injured (but not thrown off) by malicious obstruction.....	1

Total ..... 90

The month is remarkable for the disappearance of broken rails as a cause of accident and for an unusually large number of accidents from cattle on tracks and misplaced switches, and a great number of collisions, carelessness and disobedience of regulations being unusually common or unusually fatal, apparently. Four collisions and one derailment were caused directly or indirectly by the breaking of couplings. Fourteen of the accidents were caused by defects or failures of rolling stock and nine by defects or failure of permanent way, including in the latter the two wash-outs of road-bed and the malicious removal of rail.

For the twelve months ending with June our record stands as follows, being more imperfect for the first three or four months than for the others:

	No. of Accidents.	Killed.	Injured.
July.....	31	35	66
August.....	63	15	49
September.....	71	24	104
October.....	90	29	102
November.....	103	37	114
December.....	112	42	133
January.....	178	40	199
February.....	133	25	126
March.....	112	18	92
April.....	101	23	88
May.....	79	10	113
June.....	90	12	104
Totals.....	1,163	310	1,290

Last year we reported for June 44 accidents, with 63 killed and 114 injured, that report including the terrible accident on the Grand Trunk. Generally our figures indicate that while we failed last year to get information of so many of the less serious accidents, not many fatal accidents escaped our notice.

The average daily number of accidents, according to our reports, since the beginning of the current year, was 5.74 in January, 4.75 in February, 3.61 in March, 3.37 in April, 2.55 in May, and 3 in June, and for the six months, 3.83.

Three of the June accidents were caused by malice, and one other is supposed to have been; but besides these successful attempts to wreck trains there were several unsuccessful ones.

#### La Crosse & Nashua.

This company proposes to build a railroad from Nashua, Iowa, northeast about 65 miles to Lanesboro, Minn., whence trains will run over the Southern Minnesota to La Crosse. The company asks a subscription from La Crosse of \$150,000 of stock, this sum to be paid in monthly installments of 20 per cent. each month, and to be used in preparing the road-bed for the iron.









WASHINGTON PASSENGER STATION OF THE BALTIMORE AND POTOMAC RAILROAD.



### Washington Passenger Depot of the Baltimore & Potomac Railroad.

The accompanying plate shows an elevation of the new passenger depot for the Baltimore & Potomac Railroad Company, now being erected at the southwest corner of Sixth and B streets, Washington, D. C., which when completed will take rank in regard to style of finish and accommodation to the public as one of the finest in the country.

The city is indebted to the energy and enterprise of Colonel Thomas A. Scott for this handsome and commodious improvement and the lines of travel which have made it necessary.

It is to be constructed of the best pressed bricks, with Ohio stone dressings, the base course up to the level of the first story windows, and the entrance steps, to be of the Richmond granite.

It has a frontage on B street of 137 feet, and on Sixth street of 95 feet: the main entrance being on Sixth street, and the ladies' entrance on the former.

The accommodations on the first floor for passengers are ample and convenient, comprising a general waiting room 40 x 68, a ladies' room 23x45, a gentleman's room 37x20, a restaurant and dining room 45x55, with complete kitchen arrangements, a baggage room, offices, etc., etc.

The second and third floors are devoted to offices for the company, janitor's rooms, etc.

The whole building is to be finished in first class style, and is to be heated by steam throughout.

At the rear of the main building, extending along Sixth street, and covering a space of 190 feet by 510 feet, will be the roof under which the passenger cars enter and receive and discharge the passengers. It is spanned by a handsome wrought iron arch; is well lighted and ventilated, and will afford ample protection to passengers from the weather.

The design for the southern entrance to the roof is exceedingly handsome, and will be a decided ornament to the park.

The engineer and architect is Mr. Joseph M. Wilson, C. E., Engineer Bridges and Buildings, Pennsylvania Railroad.

## General Railroad News.

### ELECTIONS AND APPOINTMENTS.

—At a meeting of the directors of the North & South Jersey Railroad Company, at Camden, N. J., July 9, the following officers were elected: President, Randal E. Morgan, Camden, N. J.; First Vice-President, William Bell, Perth Amboy, N. J.; Second Vice-President, George H. Vanderbeck, Allentown, N. J.; Treasurer, Dr. H. H. Longstreet, Bordentown, N. J.; Secretary, Samuel H. Robbins, Allentown, N. J.; Chief Engineer, Robert S. Van Benschoten, Bordentown, N. J.; Division Engineer, N. McConnaghy, Somerville, N. J.

—Mr. William Wiley Smith has been appointed Superintendent of the Indianapolis Belt Railway, now under construction.

—At the annual meeting of the Lake Shore & Tuscarawas Valley Railroad Company in Cleveland, O., July 9, the following directors were elected: W. S. Streater, Amasa Stone, Jr., Selah Chamberlain, J. F. Card, R. L. Chamberlain, James Mason, H. M. Claflin, R. B. Dennis, Cleveland, O.; Clement Russell, Massillon, O.; Augustus Schell, Harvey A. Kent, New York. The board elected officers as follows: President, W. S. Streater; Treasurer, A. S. Gorham; Secretary, William A. Grout; General Superintendent, W. W. Card. Three of the board are members of the Lake Shore & Michigan Southern board.

—Mr. David B. Hershey has been appointed Master Mechanic of the Texas & Pacific Railroad.

—At a meeting of the directors of the Indianapolis, Cincinnati & Lafayette Railroad Company at Indianapolis, July 10, M. E. Ingalls was chosen a director in place of James J. Butler, resigned. The board subsequently elected the following officers: President, M. E. Ingalls (in place of W. A. Booth, resigned); Vice-President, John S. Kennedy; Secretary, Charles H. Booth; Treasurer, E. F. Osborn. Mr. Ingalls has been Receiver of the road.

—At the annual meeting of the Winchester & Strasburg Railroad Company in Baltimore, July 2, the old board of directors was re-elected, as follows: John S. Hopkins, Thomas Whitridge, Hugh Sisson, of Baltimore; J. H. Sherrard, George A. Hupp, of Virginia. John King, Jr., was re-elected President. The road is leased by the Baltimore & Ohio.

—At a meeting of the directors of the East River (New York and Brooklyn) Bridge Company in Brooklyn July 8, Jeremiah P. Robinson was elected President of the Company.

—Mr. C. W. Douglas, heretofore Superintendent of the New Jersey Division, has been appointed General Superintendent of the New York & Oswego Midland Railroad. Mr. Douglas was formerly connected with the Erie, and, until a few months ago, was Superintendent of the South Side Railroad of Long Island.

—At a meeting held in Bridgeport, Del., recently, the Delaware Shore Railroad Company was organized by the election of the following directors: Henry Allen, Wm. Sommerell, Edwin A. Vanneman, Edward H. Green, Matthew Gill, Samuel Hopkins, David B. Gill, Samuel T. Miller, William Justice, Joseph W. Cooper and John B. Lawrence. Samuel Hopkins was chosen President, D. B. Gill Secretary and Treasurer.

—Mr. T. C. Burnside has been appointed Superintendent of the Cincinnati & Martinsville Railroad, in place of J. C. McQuiston.

—Mr. B. Lyman is General Passenger Agent of the Indianapolis, Cincinnati & Lafayette Railroad, with headquarters at Lafayette, Ind.

—Mr. Reuben Foster has been appointed General Superintendent of the Richmond & Chesapeake (formerly Richmond & York River) Railroad, Mr. William N. Bragg, Master of Transportation and Mr. Edward F. Folger, General Freight and Ticket Agent.

—Mr. W. R. Carlile is Auditor and Treasurer of the Alabama & Chattanooga Railroad Company; Mr. M. Grant is General Freight and Ticket Agent; Mr. Charles L. Fitch, General Superintendent; Mr. R. C. McCalla, Chief Engineer and Superintendent Southern Division; and T. W. Tozer, Superintendent of Motive Power.

—Mr. William James, heretofore General Ticket Agent and Auditor of the West Wisconsin Railway, will hereafter be Auditor only, Mr. George M. Huntington having been appointed General Ticket Agent.

—The Mahoning & Pittsburgh Railroad Company was organized at Meadville, Pa., recently by the election of the following directors: M. P. Davis, A. S. Dickson, J. H. Lenhart, L. C. Magaw, A. H. Steele, John T. Wann, all of Meadville, Pa. At a

meeting of the board held July 5, the following officers were elected: President, A. S. Dickson; Treasurer, J. H. Devereux, Cleveland, O.; Secretary, J. H. Dynes, Meadville, Pa.; Chief Engineer, R. H. Steele.

—At the annual meeting of the Plymouth, Kankakee & Pacific Railroad Company, June 12, the following board of directors was chosen: S. T. Hanna, Fort Wayne, Ind.; J. C. Cushman, Plymouth, Ind.; E. Cobb, G. Hurling, A. Buck, Kankakee, Ill.; J. G. Strong, Dwight, Ill.; John C. Campbell, Streator, Ill.; W. Eddy, Hennepin, Ill.; Joel Hopkins, Greenville, Ill. The board subsequently elected the following officers: President, E. Cobb; Vice-President, S. T. Hanna; Secretary, J. C. Cushman; Treasurer, J. G. Strong; Chief Engineer, T. J. Nichol, Hennepin, Ill.

—Dr. W. H. Stennett, formerly of Bloomington, Ill., and for about three years General Agent of the Illinois Central Railroad at St. Louis, in which position he has shown unusual energy and activity in promoting the business of the road, has been appointed General Passenger Agent of the Chicago & Northwestern Railway, in place of Mr. Henry P. Stanwood, who has resigned, because of continued ill-health, after many years honorable service as an officer of that company, part of the time having been Assistant Superintendent of the Iowa Division, afterward General Ticket Agent in charge of the entire ticket and passenger business of the company, and for four months past General Passenger Agent, the office having been divided on account of the growing business of the company and Mr. Stanwood's illness. He now is made the company's General Agent for the Pacific coast, where it is hoped that the climate will enable him to recover.

—At the annual meeting of the New York Western Railway Company in Cedar Rapids, Iowa, June 25, D. W. C. Rowley, J. C. Brooksmit, George D. Holyoke, E. M. Greene and W. C. Kibbe were elected directors for the ensuing three years. The board of directors elected the following officers for the ensuing year: President, George Greene; Vice-President, A. V. Bronson; Treasurer, James L. Bever; Secretary, Thomas H. Benton; Assistant Secretary, J. C. Brooksmit.

—Mr. A. P. Bacon has been appointed Superintendent of the steamboats of the New Jersey Southern Railroad. Mr. James Mahoney, as General Master Mechanic, will have charge of the machinery.

—Mr. W. H. Lewis is Secretary and Treasurer of the Louisville, New Albany & Chicago Railroad Company.

—Mr. William L. Holden has been appointed General Passenger and Ticket Agent of the Lake Shore & Tuscarawas Valley Railroad.

—At a meeting of the directors of the Erie Railway, July 16, Peter H. Watson was re-elected President, and George R. Blanchard was chosen Second Vice-President, James C. Clark Third Vice-President, W. P. Shearman, Treasurer, A. K. MacDonough, Secretary; S. L. M. Barlow, Edwin D. Morgan, W. B. Duncan and Frederick Schuchardt, Executive Committee; Samuel D. Babcock, George H. Browne, Adrien Iselin, Hermann R. Baltzel, Finance Committee. The vice-presidencies are new offices. Mr. Blanchard, Second Vice-President, is the General Freight Agent, lately General Freight Agent of the Baltimore & Ohio; Mr. Clark, Third Vice-President, is Master of Transportation, and Mr. Henry Tyson, Fourth Vice-President, is (at least a Mr. Henry Tyson is) in charge of the Baltimore street railroads, was formerly an important officer of the Baltimore & Ohio, and is a gentleman of the highest character.

—Mr. A. P. Farron has been appointed Locomotive Superintendent of the Michigan Central Railroad in place of A. S. Sweet, deceased, with office at Michigan City, Ind.

—The directors of the Chicago & Southwestern Railway Company have elected the following officers for the ensuing year: President, John F. Tracy, New York; Vice-President, James N. Burnes, St. Joseph, Mo.; Secretary, H. M. Aller, Leavenworth, Kan.; Treasurer, Francis H. Tows, New York.

—It is reported that Mr. A. J. Cassatt (General Manager of the Pennsylvania Railroad), who was recently chosen General Manager of the Northern Central, will put Mr. G. Clinton Gardner, General Superintendent of the Pennsylvania road, in charge of that portion of the Northern Central between Harrisburg and Baltimore, and Mr. W. A. Baldwin, General Superintendent of the Philadelphia & Erie, in charge of the section from Harrisburg to Sunbury.

### TRAFFIC AND EARNINGS.

—The earnings of the Kansas Pacific Railway for the fourth week in June were: Passengers, \$31,520.85; freight, \$60,581.01; mails, \$2,055.32; total, \$94,157.18. Of this amount, \$5,438.80 was for transportation of troops, mails and government freight.

—The following statement of the earnings and expenses of the Great Western Railway of Canada for the four months ending May 31, is published in London:

	1873.	1872.	Increase.	Decrease.	P. c.
Earnings.....	\$2,015,100	\$1,825,400	\$189,700	.....	10 3/4
Expenses.....	1,376,000	1,039,300	336,700	.....	32 3/4
Net earnings.....	\$639,100	\$786,100	.....	\$147,000	18 3/4

The percentage of expenses to earnings in 1873 was 68.3; in 1872, 56.9.

—The following statement of the earnings and expenses of the Central Railroad of New Jersey for the six months ending June 30 has been published:

	1873.	1872.	Increase.	P. c.
Receipts.....	\$4,135,011 96	\$3,455,956 53	\$679,055 38	19 3/4
Expenses.....	2,116,478 00	2,062,426 87	54,051 13	2 3/4
Net earnings.....	\$2,018,533 96	\$1,393,529 71	\$625,004 25	44 3/4

The percentage of expenses to earnings in 1873 was 51.18; in 1872, 59.68. The earnings and expenses for June are partly estimated.

—The earnings of the Milwaukee & St. Paul Railway for the first week in July were: 1873, \$106,700; 1872, \$120,487; increase, \$76,213, or 63 1/2 per cent.

—The coal tonnage of the Philadelphia & Reading Railroad Company for the six months ending July 5 was: 1873, 3,320,090; 1872, 3,224,443; increase, 95,647 tons, or 3 per cent.

—The shipments of anthracite coal by the Schuylkill Canal for the six months ending July 5 were: 1873, 295,538; 1872, 372,520; decrease, 76,982 tons, or 20 1/2 per cent.

—The shipments of anthracite coal over the Lehigh Valley Railroad for the six months ending July 5 were: 1873, 2,275,676; 1872, 2,203,182; increase, 72,494 tons, or 3 1/2 per cent. The shipments of bituminous coal for 1873 were 16,648 tons, making the total coal tonnage 2,292,324 tons.

—The coal shipments of the Delaware & Hudson Canal Company for the six months ending July 5 were: 1873, 1,463,846; 1872, 1,497,139; decrease, 33,293 tons, or 2 1/4 per cent.

—The coal shipments of the Pennsylvania Coal Company over the Erie Railway for the six months ending July 5 were: 1873, 588,573; 1872, 583,667; increase, 1,906 tons, or 2 1/2 per cent.

—The coal tonnage of the Shamokin Division of the Northern Central Railway for the six months ending July 4 was: 1873, 285,865; 1872, 258,330; increase, 27,535, or 10 1/2 per cent.

—The coal tonnage of the Huntington & Broad Top Railroad for the six months ending July 5 was: 1873, 235,375; 1872, 152,200; increase, 83,175 tons, or 54 1/2 per cent.

—The shipments of Clearfield coal over the Tyrone Division of the Pennsylvania Railroad for the six months ending July 5 were: 1873, 279,192; 1872, 302,289; decrease, 23,097 tons, or 7 1/2 per cent.

—The coal tonnage of the Pennsylvania & New York Railroad for the six months ending July 5 was: 1873, 371,761; 1872, 330,461; increase, 41,300 tons, or 12 1/2 per cent.

—The coal tonnage of the Lehigh & Susquehanna Division of the Central Railroad of New Jersey for the six months ending July 5 was: 1873, 712,272; 1872, 596,433; increase, 115,839 tons, or 19 1/2 per cent.

—The coal tonnage of the Delaware, Lackawanna & Western Railroad for the six months ending July 5 was: 1873, 1,559,931; 1872, 1,441,691; increase, 118,240 tons, or 8 1/2 per cent. Of the shipments in 1873, 1,164,449 tons were shipped southward, and 395,482 tons northward.

—The earnings of the Marietta & Cincinnati Railroad for the first week in July were: 1873, \$43,026; 1872, \$33,906; increase, \$9,120, or 26 1/2 per cent.

—The shipments of Cumberland coal over the Baltimore & Ohio Railroad for the six months ending July 5 were: 1873, 677,576; 1872, 600,755; increase, 76,821 tons, or 12 1/2 per cent.

—The shipments of Cumberland coal by the Chesapeake & Ohio Canal for the six months ending July 5 were: 1873, 263,948; 1872, 270,148; decrease, 6,200 tons, or 2 1/4 per cent.

—The earnings of the Chicago & Northwestern Railway for the first week in July were: 1873, \$264,313; 1872, \$235,178; increase \$29,135, or 12 1/2 per cent.

—The following additional earnings for the month of June have been published:

	1873.	1872.	Inc.	Dec.	P. c.
Atlantic & Pacific.....	\$95,800	\$96,567	\$2,333	.....	2 1/4
Kansas Pacific.....	312,614	315,383	.....	.....	0 3/4
Mobile & Ohio.....	148,691	151,945	.....	.....	3,254
Pacific of Missouri.....	272,600	266,738	.....	.....	14,138
St. L., Al. & T. H. M. Line.	116,365	91,535	21,830	.....	23 3/4
St. L. & Iron Mount'n.....	48,995	35,545	13,350	.....	37 3/4
Tol., Peoria & Warsaw.....	114,401	94,522	14,938	.....	6 1/4
.....	.....	.....	20,079	.....	21 1/4

—The earnings of the Erie Railway for the week ending July 7 were: 1873, \$344,516; 1872, \$337,535; increase, \$6,981, or 2.16 per cent.

—A German paper publishes the earnings and expenses of the Brunswick & Albany Railroad for fifteen months ending with January, 1873. The gross receipts for this period were \$83,384.34; the working expenses \$63,162.01 (75 1/2 per cent.), and the net earnings \$20,222.33. The road is 171 miles long, so the average monthly receipts per mile have been less than thirty-three dollars; and the average net earnings per month per mile, about eight dollars. The largest receipts were in January last, when they were \$9,909—\$58 per mile—\$19 of which was net.

### OLD AND NEW ROADS.

#### South & North Alabama.

A suit has been commenced against this company in the New York Supreme Court by Joseph Seligman & Co., to prevent the original first mortgage on the road from being canceled. It is claimed by the plaintiffs that the company employed them in 1870 to sell \$4,000,000 of their bonds, and that they advanced \$250,000 and procured an extension of ninety days for the payment of \$150,000 owed by the railroad company. The agreement was that they (Seligman & Co.) were to get 3 1/2 per cent. commission on the whole amount of the bonds, and that the company should part with none of the bonds without their consent. Subsequently \$1,800,000 of the bonds were sold or pledged, partly but not entirely, by Seligman & Co. An arrangement was then entered into with the Louisville & Nashville Railroad Company by which G. V. Alexander became agent for both companies, and the president of the railroad company gave Seligman & Co. three checks for the commission on the \$1,800,000 bonds sold, which checks were never paid. Those bonds which were not sold or pledged were then handed over to Alexander, by whom all but \$407,000 were sold. It was then proposed to issue a new first mortgage protecting the \$407,000 of outstanding bonds and canceling all the other bonds previously issued as the basis for new bonds.

Seligman & Co. then brought suit at common law in the Court of Common Pleas to recover commission on the full amount of the bonds (\$4,000,000), and also applied in the Supreme Court for an injunction to restrain the canceling of the bonds on which they claim a lien.

The defendants claim that the agreement was not originally an equitable one, as it gave the plaintiffs all the benefits; that even admitting the bargain to be a valid one, it was the subject of a common law action; and, further, that in accepting the President's checks for commission on part of the bonds sold the defendants lost whatever equitable lien they might have had.

#### Illinois & St. Louis Bridge.

The work of putting up the superstructure is making considerable progress. Nine lengths of tubes, or ribs, on each side of the first arch are in place and only three lengths more on each side require to be put in position in order to complete the first arch.

Work on the approaches on the St. Louis side is making rapid progress. Some delay has been caused in the tunnel by unexpected quantities of water met with and also by the necessity of changing the course of several of the city sewers.

#### La Crosse Bridge.

The contract which is proposed to be made between the Southern Minnesota and the La Crosse Bridge companies, provides that the Southern Minnesota is to use the bridge for 20 years, the rates of toll to be adjusted at the end of each five years. If the parties in interest cannot agree, the rates are to be adjusted by a court of equity. At the end of the 20 years the Southern Minnesota is to have the privilege of purchasing the bridge, a court of equity to fix the price, if the parties interested cannot agree.

#### New Jersey Midland.

The officers of this road state that arrangements are being made for the construction of the proposed branch or extension from Ogdensburg, N. J., to Belvidere. This extension would be about 35 miles long, and it is expected would have a considerable traffic in iron, iron ore and coal.

Arrangements are also being made for the construction of the freight track over Bergen Hill to Weehawken and the building of the necessary docks and freight houses there.

#### Oairo & Fulton.

Surveys are being made for a branch from the main line to the Arkansas Hot Springs, which are a little distance to the west of it.

#### Central Pacific.

A San Francisco dispatch says: "Parties in interest here deny the statement made by New York papers that the proposed purchase of the Central Pacific Railroad did not include the entire interest of Huntington. The Eastern associates, to the contrary, say they were to purchase all the stock of the company, except that owned by Stanford, who alone of the original



parties was to remain in interest. It is still believed the bargain will be consummated."

The county of San Joaquin, Cal., has brought suit against the Central Pacific and Western Pacific railroad companies, to recover stock of the latter company to the amount of \$250,000, for which bonds of the county were given in exchange.

#### Dividends.

The Westchester & Philadelphia Railroad Company paid, July 15, a dividend of 4 per cent. on preferred and consolidated preferred stock.

The Minehill Railroad Company will pay a dividend of \$1.75 per share, July 17.

The Cayuga & Susquehanna Railroad Company (whose road is leased to the Delaware, Lackawanna & Western) has declared a dividend of 4 1/2 per cent., payable on demand.

The Little Schuylkill Navigation Railroad & Coal Company has declared a dividend of 3 1/2 per cent., payable on demand.

The Schuylkill Navigation Company announces a dividend of 60 cents per share on the preferred, and 30 cents per share on the common stock, payable in scrip July 15, which scrip, in sums of \$100 and upwards, will be converted into the mortgage loans of the company after September 3, 1873.

The Columbus & Hocking Valley Railroad Company has declared a semi-annual dividend of 5 per cent., payable August 1.

The Delaware & Hudson Canal Company has declared a dividend of 5 per cent., to be paid, together with the interest due shareholders upon their paid-up installments of the new stock, at the National Bank of Commerce in New York, August 1.

The Chesire Railroad Company paid a dividend of 2 per cent. July 15.

#### Springfield & Fort Smith.

A convention was held at Fort Smith, Ark., July 4, to advocate the construction of a railroad from Springfield, Mo., to Fort Smith, Ark. The usual resolutions were passed and committees appointed to further the object in view.

#### Montclair.

It is stated that the lease of this road to the New York & Oswego Midland will not be made permanent, as the company's charter gives it no authority to make such lease. Meantime the road continues to be operated under a temporary lease, and it is said that arrangements will be made by which the road will be operated in connection with the Midland.

It is said that an effort will be made to complete the road to Greenwood Lake and to commence work on the proposed extension from Greenwood Lake to Middletown, N. Y., this year.

#### Missisquoi & Clyde Rivers.

The new line from Boston to Montreal, passing over the Connecticut & Passumpsic Rivers, the Missisquoi & Clyde Rivers, and the Southeastern Counties Junction (of Canada) roads, was opened for travel July 8. The Missisquoi & Clyde Rivers road is the new portion of the line and extends from Newport, Vt., west to Richford, 32 miles. At Newport connection is made with the Connecticut & Passumpsic Rivers and at Richford with the Southeastern Counties Junction road.

#### Ashtabula, Youngstown & Pittsburgh.

The first cargo of iron ore from Lake Superior for shipment to Pittsburgh over the new road arrived at Ashtabula Harbor, July 10.

#### North Louisiana & Texas.

The Shreveport (La.) Times says that the engineers are already at work on the extension from Monroe, La., the present terminus, to Shreveport, and that it is stated that the line will be completed in four months.

#### Little Rock & Fort Smith.

The rolling stock, buildings and road bed in Little Rock, Ark., were sold at auction July 8, under an execution in favor of Greene, McKnight & Co., of Jersey City, N. J. Mr. A. P. Curry, of Memphis, was the purchaser.

#### Detroit & Bay City.

The ballasting of this line is now completed, and trains will be put on from Detroit to Bay City July 20. The line is about 109 miles long.

#### Milwaukee & Northern.

The contract for the bridge across Fox River at Green Bay, Wis., has been let to Mr. Klaus, of Green Bay, with the exception of the draw, which will be built by Fox & Howard, of Chicago. The bridge will be 1,300 feet long and the draw span 224 feet.

#### Green Bay & Lake Pepin.

The contracts for the grading from Merrillan, Wis., west to Arcadia, about 35 miles, are let. The contracts from Arcadia to Winona, Minn., are to be let as soon as the location is completed.

#### Iowa Pacific.

The directors of this company have appointed an agent in Berlin, Germany, to negotiate the bonds of the company. The road is said to be nearly all graded from Fayette, Ia., to Fort Dodge (132 miles), but work was stopped last fall for want of funds.

#### Northern Pacific—Pacific Division.

Nearly 21 miles of the grading on the extension north of Tenino are finished.

The terminus on Puget Sound has not yet been decided on, but it is announced that it will be either at Tacoma or Seattle. Tacoma is on Commencement Bay, on the east side of the Sound and 34 miles north of Olympia, the capital of the territory. It is a small village of about 100 inhabitants. Seattle is on Elliot Bay, 30 miles north of Tacoma and has about 1,800 inhabitants, being the most important place on Puget Sound. At both places there is deep water and natural facilities for a large port.

The company has recovered to the citizens of Olympia the lands donated for a terminus.

#### Philadelphia & Reading.

This company took possession, July 14, of the old line of the Philadelphia, Wilmington & Baltimore Railroad from Gray's Ferry, Philadelphia, to Ridley Junction, near Chester. This line, which is 12 miles long, will hereafter be known as the Philadelphia & Chester Branch of the Philadelphia & Reading road, and will be worked as a part of the main line. It is also said that the company has purchased the Chester Creek Railroad, which extends from Lamokin northwest about seven miles to the Philadelphia & Baltimore Central road, and that it is to be extended from Lamokin to Ridley Junction.

The purchase of the line to Chester gives the Philadelphia & Reading access to the Delaware below Philadelphia, and also enables it to deliver coal direct to the large manufacturing establishments at Chester and other points along the Delaware. Arrangements are also being made by which cars will be run and passengers ticketed through from Baltimore to points on the Reading road.

#### Delaware, Lackawanna & Western—Morris & Essex Division.

The maps and other papers necessary to enable the company to construct the new tunnel through Bergen Hill, under the general railroad law, have been filed with the Secretary of State at Trenton, N. J. The eastern entrance to the tunnel will be a few rods from the Ravine road, near the Jersey City and Hoboken boundary line. Thence the road will extend in a straight line to near the mouth of the Erie tunnel on the west side of

the hill, and the road will then cross the Erie track at an elevation of thirty-five feet. From the opening the tunnel will extend 1,800 feet to Oakland avenue, whence there will be a cut of 1,200 feet to Bergen Wood avenue. The tunnel will then be continued 1,700 feet to the terminus. At the Hackensack River the company intend to build a new bridge near that of the Pennsylvania Railroad. It is reported that offers have been made to take the contract and complete the work in eighteen months. The new line will be a much needed improvement, as the capacity of the Erie tunnel is too small for the traffic now passing through it, and much delay and inconvenience is the result.

#### National.

It is reported that a syndicate has been formed to take the \$3,500,000 of bonds which this company is about to issue. It is said that the road from Bound Brook to the Delaware River and the bridge across that river at Yardleyville can be completed in three months if the money can be provided. The Philadelphia & Newton road having passed under the control of the Pennsylvania Railroad Company, a new line will have to be built from Yardleyville to Philadelphia. If the track can be completed to Bound Brook, the New Jersey Central can be used for a time from Bound Brook to Jersey City.

#### New Mail Routes.

An extension of mail service has been ordered over the newly opened section of the Burlington & Southwestern Railroad from Cincinnati, Ia., to Unionville, Mo., 15 1/2 miles, at an annual compensation of \$437.50.

An extension of mail service has been ordered over the recently completed section of the Milwaukee Division of the Burlington, Cedar Rapids & Minnesota Railroad, from Center Point to Independence, Ia., 20 miles.

#### Philadelphia, Wilmington & Baltimore.

The old line from Gray's Ferry, in Philadelphia, to Ridley Junction, near Chester, Pa., having been transferred to the Philadelphia & Reading Company, all trains now pass over the new line, known as the Darby Improvement.

#### Mahoning & Pittsburgh.

This company, recently organized at Meadville, Pa., purposes to build a railroad from Newcastle, Pa., westward to the State line, near where it is crossed by the Pennsylvania & Ohio Canal, in Lawrence county. The road will be about 9 miles long and will be parallel and close to the Lawrence Branch of the Pittsburgh, Fort Wayne & Chicago.

#### Schenectady & Susquehanna.

This road (from Schenectady, N. Y., southwest to Quaker Street on the Albany & Susquehanna road, 15 miles) was sold under foreclosure at Schenectady, July 10. It was bought by Col. D. D. Campbell, the price paid being \$351.75 over all previous liabilities.

#### Michigan Central.

The second track is now being laid between the Air Line Junction and Michigan Center.

#### Springfield & Northwestern.

Iron for 12 miles of the road has been purchased and track-laying will shortly be commenced from Petersburg toward Springfield.

#### Peoria, Atlanta & Decatur.

This line is now under contract from the junction with the Toledo, Peoria & Warsaw, near Peoria, Ill., to Atlanta. The location from Atlanta to Kinne is just completed and contracts will be let at once. From Kinne to Decatur contracts will be let as soon as the work of location is completed.

#### Northwestern Union.

Track is laid from Milwaukee northward to Germantown, Wis., a distance of about 20 miles. From Fond du Lac the track-layers have reached West Bend, 27 miles. About 20 miles of track remains to be laid.

#### Chesapeake & Ohio.

Cars began to run through the Lewis Tunnel, July 4. Heretofore a temporary track has been used at that point. By the completion of the tunnel a saving of some 20 minutes in time is made.

#### Rockford, Rock Island & St. Louis.

Trains now run into Rock Island by way of Minersville and Moline, instead of going by way of Coal Valley and Milan.

#### Pacific, of Missouri.

About 300 feet of the track of this road near Kickapoo, Kan., was undermined by the water and fell into the Missouri River, on the evening of July 8. Fortunately, the break was discovered before any accident had happened. A new road was constructed around the break by cutting into the bluffs.

#### Northern Pacific.

It is said that this company has agreed to construct a track from Duluth, Minn., along Rice's Point and O'Connor's Point to the depot grounds in Superior, Wis., and complete it within eight months.

The last accounts received from the surveying expedition now in the field in Dakota, left it at a point about 60 miles west of Bismarck.

#### Pennsylvania—New York Division.

Workmen are now clearing the ground for the extension of the passenger depot in Jersey City and taking down the front of the present depot. The present structure was completed in the summer of 1853, and was then the largest in the vicinity of New York, and it was expected that it would be large enough for the needs of the road for many years to come. The new building is to be an extension of the present one, which is to remain standing.

Four of the through conductors running between New York and Philadelphia and one of the gate-keepers in Jersey City were recently arrested on the charge of defrauding the company. On trains coming into New York the conductor does not take up the ticket but cancels or punches it, and it is taken up by the gate-keepers as the passenger passes from the depot in Jersey City into the ferry-house. It is alleged that the accused conductors would not cancel a number of the tickets, and that the gate-keeper, being in collision with them, would take the uncanceled tickets and sell them, the confederates dividing the profits. The fraud was first detected in the general ticket office, from the fact that the number of tickets returned cancelled was much less than the number reported as sold.

#### St. Louis & Florissant.

The original contractors having failed to comply with the terms of the contract, the work has been re-let to Coffee & McGowan, of St. Louis. The grading is to be completed by January 1, 1874.

#### The Lease of the United Railroads of New Jersey.

The Court of Errors and Appeals of New Jersey has, somewhat late in the day, rendered a decision in the matter of the appeal from the decision of the Chancellor refusing an injunction against the lease of the roads to the Pennsylvania Railroad Company. The decision takes the ground that the act of 1870 did not authorize the lease, and that the directors had no right to make it. The decree of the Chancellor is reversed with costs in this Court and the Court below, and the case is remitted with an order that the injunction issue, unless it ap-

pears by such proceedings as may properly be taken in the Court below that some essential change, since the order now reviewed, has taken place in the status of the case, by reason of which the equities are changed or a different mode of relief has become necessary.

Judge Dalrymple concurred, except in reference to the act of 1870, and that, he thought, was unconstitutional. Chief-Justice Beasley dissented, and read an opinion in which he declared the act of 1870 constitutional and of sufficient force to authorize the lease. The lease had been made, therefore the order of reversal was worth nothing whatever. It could alter nothing, and was not sought in good faith by the appellants, but merely to get abstract opinions of law. The court stood as follows: Reversal, 7; affirmative, 1.

#### Pittsburgh, Cincinnati & St. Louis.

The laying of the second track through the tunnel at Cork's run, near Pittsburgh, has been completed. The tunnel was originally built for a single track, and the work of enlarging it so as to allow room for the second track has been one of much difficulty, as it had to be done without interfering with the passage of trains over the single track.

#### New Jersey Southern.

The old steamers Metropolis and Empire State, formerly of the Fall River line from New York to Boston, and which were for many years familiar to travelers, have been fitted up as freight boats for this company, to run between New York and Sandy Hook. They have capacity for a large amount of freight.

#### Meetings.

The Cleveland & Mahoning meets for election of directors at the office in Cleveland, August 6.

#### Cincinnati & Terre Haute.

At a recent meeting of the directors, the Vice-President, Mr. L. A. Burnett, was placed in charge of the road during the absence of the President. He is instructed to reduce the expenses of the company to the smallest possible amount, and has also full powers to make a settlement with its creditors. It is understood that an effort will be made to settle with the creditors by giving six months' notes, bearing 10 per cent. interest.

#### Baltimore Union Railroad.

A sharp controversy is going on over the ground intervening between the end of the Union Railroad tunnel and the Baltimore & Potomac tunnel. The land belongs to the Northern Central Company, but the Union Railroad Company claims the right of way over this half mile of ground in order to connect its road with the Baltimore & Potomac Railroad, thus giving an outlet to tide-water at Canton. The Northern Central road resists this attempt to use its ground, because it requires all the land it holds for the purpose of storing cars and engines and to build a grand union depot. The case was referred to a jury, which condemned about one acre of the Northern Central land, running between North and Charles streets, assessing the property at \$35,000. Another jury has been summoned to determine whether the remainder of the ground in controversy shall be condemned. It is understood that the Northern Central Company intends to appeal to a court of law from the decision of the jury ofquisition.

#### Lake Shore & Michigan Southern.

This company has purchased 160 acres of land near Cleveland, O., on which new shops are to be erected. Work on the shops will be commenced at once.

#### North Carolina.

Another injunction to prevent the Richmond & Danville Company, lessees of this road, from changing the gauge of any portion of it, has been issued at the suit of Thomas Webb, a stockholder. The suit is brought to test the validity of the lease, which, it is claimed, the North Carolina Company had no right to make. It is also claimed that, even if the lease is valid, the lessees have violated it by making excessive charges for local freight and passengers.

#### Atlantic & Pacific.

A stockholder of the company in New York has obtained an injunction restraining the company from paying the quarterly dividend of 1 1/2 per cent., due on the Missouri Pacific stock under the terms of the lease. The complaint alleges that the lease is a burden on the Atlantic & Pacific and unjust to the interest of the stockholders of that company.

#### Buffalo & Jamestown.

Regular trains are now running from Buffalo to Eden Center, 19 miles.

#### Gilman, Clinton & Springfield.

A temporary injunction was issued July 8, by the McLean County (Ill.) Circuit Court to prevent the lease of this road to the Pennsylvania Company. The directors had leased the road for 999 years, the Pennsylvania Company agreeing to pay the principal and interest of certain debts, which, as the bill charges, are fraudulent. The bill also charges large frauds in the construction of the railroad, by which a Pennsylvania corporation, known as the Morgan Improvement Company, secured enormous profits at the expense of the stockholders of the road, and prays for the appointment of a receiver, and that an account be taken before a master in chancery to ascertain the rights of the stockholders.

#### Washington & Ohio.

Tracklaying on the extension from Hamilton, Va., to Purcellsville was commenced June 23.

#### Nashua & Rochester.

The directors of this company have voted to make an assessment of 25 per cent. on the stock, payable July 29.

A meeting of the stockholders is to be held shortly to vote on the acceptance of the act of the New Hampshire Legislature authorizing an issue of bonds.

#### Columbus & Hocking Valley.

The construction of the coal branches on Monday Creek and Snow Fork is to be proceeded with at once.

#### New Orleans, Baton Rouge & Vicksburg.

The franchisees of this company with what property it possesses were to have been sold at sheriff's sale July 14, under executions issued at the suit of several creditors.

#### Des Moines Valley.

The execution of the sale of this road has been withdrawn without prejudice by the agreement of the parties. The execution was issued at the instance of the holders of the mechanics' lien, their claim being about \$55,000. The conditions of the withdrawal were the payment to the holder of the mechanics' lien of \$1,000 down, and accounting for the net earnings of the road to them until the claim is paid. The first payment was made July 7, consisting of \$10,000, the net earnings for June.

#### Statistics of American Railroads.

From the introduction to the new issue of Poor's Manual of the Railroads of the United States, recently published, we take the following extremely interesting tables and other statistics, which, we are sure, are much more complete and accurate than any we have had heretofore. The compiler says that the offi-



cial reports made to the State authorities, where these are required, have been used, and these give complete information for Massachusetts, Connecticut, New York, Pennsylvania, Ohio, Illinois and Minnesota. Where these sources were wanting the reports of the separate companies to the stockholders have furnished the data.

There had been constructed in the United States up to the first day of January, 1873, 67,104 miles of railroad, of which 6,427 were constructed the past year. Annexed will be found a series of tabular statements giving in a condensed form a sketch of the progress of our railroads, their condition, and the results of their operations for the past year:

Tabular Statement showing the number of miles of railroad in the United States since 1830, and the number of miles constructed each year since that date:

Year.	Miles in Operation.	Annual Increase of Mileage.	Year.	Miles in Operation.	Annual Increase of Mileage.
1830	23	..	1852	12,908	1,286
1831	95	72	1853	15,360	2,452
1832	229	134	1854	16,720	1,360
1833	381	151	1855	18,374	1,654
1834	638	253	1856	22,017	3,643
1835	1,098	460	1857	24,503	2,486
1836	1,773	675	1858	26,968	2,465
1837	1,497	224	1859	23,789	1,821
1838	1,913	416	1860	30,635	1,846
1839	2,302	389	1861	31,360	725
1840	2,818	516	1862	32,120	760
1841	3,535	717	1863	33,170	1,050
1842	4,036	491	1864	33,908	738
1843	4,185	149	1865	35,085	1,177
1844	4,777	592	1866	36,827	1,742
1845	4,633	256	1867	39,276	2,449
1846	4,910	277	1868	42,255	2,979
1847	5,398	488	1869	47,372	5,117
1848	5,996	598	1870	52,898	5,525
1849	7,365	1,369	1871	60,677	7,779
1850	9,121	1,656	1872	67,104	6,427
1851	10,982	1,961			

In the preparation of the preceding tables, the number of inhabitants in each State and Territory is estimated according to the ratio of increase shown by the census of 1870, and is undoubtedly very nearly correct. In giving the ratio of railroad mileage to area and to population, the whole number of miles of completed railroad, as shown on page 29 of the introduction, is taken. For the States of Maine, New Hampshire, Massachusetts, Connecticut, New York, Pennsylvania, Ohio, Indiana, Illinois, Michigan, Iowa, Minnesota, Alabama and Texas, the mileage is taken from the official reports of Railroad Commissioners or other State officers. Elsewhere, the division by State boundaries is made upon the reports of the various railroad companies. In the extended tabular statement showing the cost, earnings, &c., no reference is made to the mileage of the roads, but only those roads are included whose operations are given. For example, the total number of miles of completed road, as shown on page 29, is 67,104. The mileage of those the operations of which are given, is only 57,323. While, therefore, the statement of ratio of mileage to area and population is strictly according to the fact, the summary of mileage for each State in the table of cost, earnings, &c., may be very wide of it. So with the earnings. The State of Iowa shows only \$8,993,466 of earnings, and only \$6.82 to an inhabitant, while the actual earnings of all the roads in operation in that State were undoubtedly twice that sum; but they are embraced in the statements of railroads which have portions of their lines in other States. The earnings per head of the railroads of the several States will undoubtedly nearly equal the aggregate of those of the group with which they are classified, and into which the country, from its topographical features, naturally divides itself, viz.: the New England States, comprising all that section which lies to the east of the Hudson River and the railroads parallel to it; the Middle States, occupying the region north of the Potomac and east of the Ohio River and the great lakes, including West Virginia; the Western States, including all north and west of the Ohio River to the Rocky Mountains; the Southern States, embracing all south of the Potomac and Ohio rivers, except West Virginia, and the Pacific States and Territories. Each of these groups expresses not only natural divisions of the country, but they all differ greatly in the industrial pursuits of their people. Those of the New England States are commercial and manufacturing; those of the Middle States commercial and mining; those of the Western States are engaged in agriculture, in the production of cereals; those of the Southern States in the production of cotton, in the cultivation of large plantations. The industries of the Southern States, however, are slowly undergoing a radical change; but this change has not yet proceeded sufficiently far to affect the conditions or prospects of their railroads. The people of the Pacific States are largely engaged in mining the precious metals.

It will be seen that there is a difference between the total number of miles of completed railroad and that of roads, the operations of which are given, of 9,781 miles. This mileage is largely made up of lines which are only partially completed, and of which 6,427 miles came into operation during the year, and which, for sufficient reasons, make no return of earnings. Statements showing the financial condition of such roads will be found in their proper places in the body of the Manual. In a few instances we have been unable to obtain any information whatever in reference to completed lines, and in other cases only gross returns of earnings have been made, without any division between those received from passengers and from freight. In such cases we have made an estimate of these items based on the actual returns received from roads situated in the same group and transacting a similar business. It must be remembered that railroad companies in this country are voluntary associations, and, in a great majority of cases, are not compelled to publish annual reports. It is also to be borne in mind that there is no fiscal year common to all the railroads of the country, or even to those of the same State, so that the period embraced in these tables is that of the last preceding fiscal year of the company and not the calendar year, 1872.

The total cost of the railroads, the operations of which are given for the past year, as shown by the preceding table, is \$3,159,425,057, made up of \$1,647,844,113 of capital stock, and \$1,511,579,944 of various forms of indebtedness, chiefly of bonds maturing at distant periods. The capital stock amounted to 52.15 per cent., and the debt to 47.85 per cent. of the total cost. The cost of these roads per mile was \$55,116. The gross earnings for the year were \$473,241,055, of which \$132,309,270, or 28 per cent., was received for transportation of passengers, and \$340,931,785, or 72 per cent., for the transportation of freight, including under this head the small amount received from "miscellaneous sources." The receipts per mile were \$8,256. The ratio of earnings to population was \$11.76 per head. The operating expenses for the year were \$307,486,682, or 65 per cent. of the gross receipts, leaving \$165,754,373, or 35 per cent., as net earnings. The percentage of gross receipts to the total cost of the roads was 15 per cent.; of net earnings 5.3 per cent. The amount paid in dividends was \$64,418,151, or 3.91 per cent. of the aggregate capital stock. The balance of net earnings, \$101,336,222, was equal to 6.70 per cent. on the aggregate indebtedness of the roads.

The earnings of the railroads of the several sections differed, of course, very greatly, the most productive lines being those embraced in the groups which include the New England and the Middle States. The railroads of New England earned, during the past year, \$48,519,835—being \$10,636 per mile, and \$13.53 per head of population. Their total cost was \$230,609,794, of which 55.94 per cent. was represented by capital stock. Their cost per mile was \$53,418. Their gross earnings were 21.1 per cent. of their cost. Their net earnings \$14,435,481, and at the rate of 6.26 per cent. of their total cost. The dividends paid amounted to \$8,559,877, or 6.64 per cent. on the aggregate capital stock of \$129,012,748.

The cost of the railroads of the Middle States was \$922,700,774, or \$79,427 per mile, of which 60.56 per cent. was represented by capital stock. Their earnings were \$169,205,702, or \$14,565 per mile and \$15.86 per head of population. The net earnings were \$59,527,048. The gross receipts were 18.3 per cent. of the total cost; the net earnings 6.4 per cent. The amount paid in dividends was \$32,344,971, or 5.79 per cent. of the capital stock of \$553,838,174. In the State of New York, however, the capital accounts of the New York Central and the Erie railroads include \$101,498,248 of fictitious capital, of which \$54,436,626 was issued by the former as the estimated value of its property above cost, and \$47,061,622 by the latter as the discount on bonds converted into stock. These sums, deducted from the capital stock of the railroads of the State, reduced the amount in that group to \$437,339,926, and the cost of the roads to \$22,802,526. The percentage of gross earnings on this sum was 20.6, and of net earnings 7.25; and the dividends paid were 7.09 per cent. of the actual capital stock of the roads.

The total mileage of the railroads of the Western States, the operations of which are given, was 23,778—built at a cost of \$1,472,625,232—made up of \$724,686,048, or 40.21 per cent. of capital stock, and \$747,939,186 of debt. The cost per mile was \$50,550, against \$50,418 for New England and \$79,427 for the Middle States. The gross earnings were \$193,825,252; being \$13.76 per head of population. Net earnings, \$67,317,083. The ratio of gross receipts to cost was 13.1 per cent., against 21.1 in New England and (with the reduced capital) 20.6 per cent. in the Middle States. The ratio of net earnings to cost was 4.57 per cent. against 6.26 for New England, and 7.24 for the Middle States. The number of inhabitants per mile of road in the Western States is 433; in the New England and Middle States, 770. The receipts per mile in the Western States were \$6,735 against \$10,636 in New England, and \$14,565 in the Middle States. The dividends were \$20,493,447, being 2.83 per cent. on the capital stock.

These statements disclose, at a glance, the position of the Western railroads. Their unproductiveness, compared with those of the Eastern States, is due simply to the excess of mileage to population. The earnings per head are nearly as great in the former as in the latter. Should no more railroads be constructed in the Western States for six or seven years, this disparity would be corrected by the rapid increase of their population; which may be estimated at 600,000 annually. The increase of earnings from such increase of population would fully equal \$8,000,000 annually, which, together with the increase of receipts from the permanent population, estimated at one dollar per head, annually, would, were no new lines set in operation, soon bring up the receipts per mile and per cost of the Western railroads to the standard of the New England and Middle States.

The leading railroad companies of the West are largely responsible for the excess of mileage that has been constructed. The Milwaukee & St. Paul Railway has increased from 830 miles in 1868 to 1,396 in 1872. Its stock and bonds have in the same time increased from \$30,578,615 to \$56,299,644; while the earnings have only increased from \$6,577,645 to \$6,957,771. Nearly the whole increase of mileage has proved unproductive. The Chicago & Northwestern Railway has also enormously increased its mileage in the construction of branch lines, so that the gross revenue upon its investments is considerably below the average for the Western States. It is increasing its bonded debt to \$48,000,000, to complete the various enterprises which it has undertaken. Its share capital at the close of the fiscal year for 1872 amounted to \$35,878,644. To these two sums is to be added the capital of its leased lines, making an aggregate of nearly \$100,000,000, with earnings, at the rate of the last fiscal year, of only about 11 per cent. While these vast additions to mileage and cost have been going on, the earnings of the road have declined from \$12,614,846, in 1868, to \$11,402,161, in 1872. The stockholders of these roads should put a stop to a policy so suicidal—a policy which is working more mischief to the railroad interests of the country than all other causes combined, and which, unfortunately, has been indulged in, though in a less degree, by other roads than those named.

In the Southern States, the total mileage, of which operations are given, was 10,986. The cost of the railroads was \$401,913,267—or \$36,575 per mile—being less than one-half the cost per mile of those of the Middle States, and 70 per cent. of the cost per mile of those of the New England and Western States. The capital stock was \$171,633,155, or 42.71 per cent. of total cost, and the debt, \$230,280,112. The gross earnings were \$47,788,539—being \$4,350 per mile—against \$10,636 for New England, \$14,565 for the Middle and \$6,735 for the Western States. The net earnings were \$16,455,490. The earnings per head were \$4.31. The ratio of gross receipts to cost was 11.83 per cent.; of net earnings, 4.09 per cent. The dividends paid amounted to \$3,006,856—being 1.5 per cent. of the capital stock.

The recent war proved a severe check to the prosperity of the railroads in this section of the country. The revolution in their industries which is slowly going on in these States will prove, in the end, of great advantage, though considerable time will be required to restore to them their former material prosperity.

In the Pacific States, with a mileage of only 1,368, the cost has been \$131,573,990—or \$95,300 per mile—represented by \$63,623,900, or 49.11 per cent. of capital stock, and 50.89 per cent. of indebtedness. The gross receipts were \$13,900,727, or 10.5 of the cost, and the net earnings, \$8,018,271, or 57.7 per cent. of the gross earnings and 6 per cent. of the total cost. The earnings per mile were \$10,161; per head of population, \$17.

By reference to the preceding statements, it will be seen that the train mileage is fully given for the more important States. That for Massachusetts was 14,167,563; the earnings were \$25,363,177; the earnings per mile run by trains, \$1.79. For New York the train mileage was 33,181,291; earnings, \$60,920,055; earnings per mile run, \$1.83. For Pennsylvania, the train mileage was 54,799,869; earnings, \$74,349,343; earnings per mile run, \$1.36. For Ohio, the train mileage was 43,319,941; earnings, \$55,516,435; earnings per mile run, \$1.28. For Illinois, the train mileage was 30,369,720; earnings, \$43,796,478; earnings per mile run, \$1.44. For the five States, the mileage was 175,838,884 miles; the earnings, \$259,945,488; earnings per mile run, \$1.49, nearly. The receipts per mile for the whole country will not differ much from the above rate. In round numbers, the gross earnings may be estimated at the rate of \$1.50 per mile run; net earnings, 50c.

It is to be borne in mind that the motive for building railroads in this country is often not so much the direct income to be derived from them as the incidental advantages they secure. The Pennsylvania Railroad, one of our largest and most prosperous enterprises, was undertaken as a means of increasing the trade of Philadelphia, and could not have been constructed without the aid furnished by that city in its corporate capacity. A railroad is now regarded as a necessary highway

for every community, and its construction is to be secured, if it cannot be otherwise, in the same manner as ordinary highways. To this end the State of New York has authorized nearly all of her cities and towns to subscribe to the stock of railroads. In the West, land-grants have been another powerful motive for the construction of these works. Many of those that have been constructed for the reasons stated are among the most productive, although for a time the ratio of income to cost is very small, and shows most unfavorably in contrast with those of the Eastern States or of foreign countries.

As will be seen, the earnings from the transportation of freight the past year were nearly three-fourths of the gross amount. The ratio of freight to passenger earnings is constantly increasing—a most favorable feature, as it indicates a very rapid development of the industries of the country. The total number of tons transported the past year will probably exceed 200,000,000 tons. The tonnage for the New England States exceeded 16,633,800 tons, or 3,660 tons to the mile. The tonnage in the Middle States equaled 93,400,000, or 8,041 tons per mile. The tonnage for both groups equaled 110,033,800 tons, or 6,790 to the mile. The immense tonnage for the Middle States is due largely to the anthracite coal trade of Pennsylvania. It is only in the States in which railroads are required by law to make returns, that we have been able to give them complete. In the State of Ohio, the tonnage of its roads equaled 17,061,707, or 3,588 tons to the mile; in Illinois, 11,841,178 tons, or 2,245 per mile.

We have the means of ascertaining the rate of increase of railroad tonnage only in three States, Massachusetts, New York and Pennsylvania, the railroads in those States having been required in 1873, and consecutively since, to make annual returns of their operations. The following statement will show the increase in these States, in a period of ten years:

YEARS.	TONS MOVED ON RAILROADS IN		
	Massachusetts.	New York	Pennsylvania.
1872.....	9,160,729	17,319,694	55,012,051
1862.....	3,708,670	5,803,955	15,745,375
Increase in 10 years.	5,452,059	11,505,739	39,266,676
Increase per cent.....	147	200	249

In the above table, only the tonnage actually transported over roads within the States named is given. In all cases where the reports embrace tonnage also counted in other States, by reason of the road lying partly in each State, or on branch roads connecting with a main line, the proper deduction has been made.

With regard to the future increase of receipts, it is probable that they will double themselves in the next ten years—that is to say, in 1881 their receipts will reach \$1,000,000,000. The States in which the actual increase in 10 years ending in 1872 can be ascertained were those first named. In the State of Massachusetts, the mileage in operation in 1863 was 1,249; the receipts were \$10,843,579; and the receipts per mile were \$7,453. The mileage in 1872 was 1,453; the receipts, \$25,363,177; and the receipts per mile, \$17,455. The increase in mileage was 204 miles, or 16.3 per cent., while the increase in receipts was \$14,519,598, or 134 per cent., and the increase in receipts per mile was \$9,972, or 133 per cent. The mileage in New York in 1863 was 2,425; the receipts \$30,591,661. The receipts per mile in 1863 were \$12,558. In 1872, the mileage was 4,731, an increase of 94 per cent.; the receipts, \$60,920,055, an increase of over 99 per cent.; and the receipts per mile, \$12,876, an increase of about \$300 per mile. An extraordinary impulse has been given to the construction of railroads in New York for the past few years, by the provision of law allowing municipal corporations to subscribe to their capital stock.

In Pennsylvania, the mileage in 1863 was 2,757; the receipts, \$33,046,463, and the receipts per mile, \$11,970. In 1872, the mileage in operation was 4,332, an increase of 57 per cent.; the receipts were \$74,349,343, an increase of 133 per cent.; the receipts per mile, \$17,102, an increase of 43 per cent.

The receipts of the railroads of these three States, in 1863, were \$74,481,503; in 1872, \$160,632,575, an increase of \$86,151,072, or over 115 per cent. The receipts per mile in 1863 were \$11,580; in 1872, \$15,275, an increase of \$3,695 per mile, or over 30 per cent.

The total mileage of the railroads in the United States has more than doubled since 1863. It is fair to presume that the ratio of increase in receipts has been one-half greater than in mileage. The earnings, therefore, for 1863 may be fairly estimated at \$190,000,000, against \$472,241,005 for 1872, showing an increase in ten years of \$280,000,000, or 280,000,000 annually.

The correctness of these estimates will be fully verified by reference to the condensed statements, for the leading railroads, covering periods of ten years.

The railroads of Great Britain are the only ones, outside this country, the results of the operations of which can be compared intelligibly with those of our own. But it would be improper to compare the railroads of Massachusetts with those of Iowa in hope of deducing any valuable inference therefrom; the earnings of a railroad depend upon its age. Those in Massachusetts, the greater part of them, at least, have been in operation twenty years; those of Iowa, say five. The investment in each State may be nearly the same per mile, but the earnings, from the short time in which the roads of the latter have been in operation, may not be half as great in one case as in the other. A comparison of the results of the operation of the railroads of the United Kingdom with those of the United States is subject to the same objection, as the railroad mileage in the former increases very slowly, while that of the railroads in the United States has doubled itself within ten years. It would be proper to compare the railroads of the former country with those of the New England and perhaps of the Middle States. We have, however, annexed a tabular statement comparing the results of railroad investment in the two countries, and of the former with those of the different sections of the latter. Of course, a comparative statement made a year from this time may show very different results. The earnings of the railroads of Great Britain are for 1871, and are given at \$5 per pound:

Statement showing the Mileage, Cost, Earnings, Earnings per Mile and per Head of Population, etc., of the Railroads of the United States, and of the different sections of the United States, compared with those of the Railroads of Great Britain.

Groups for comparison.	Mileage.	Cost of Roads.	Cost per Mile.	Earnings.	Earnings per Mile.	Earnings per Head of Pop.	Pop. per Sq. Mile.
States.	4,574	230,609,794	\$50,418	\$48,519,835	10,635	21.10	6.26
N. Eng.	11,617	922,700,774	\$79,427	\$169,205,702	14,565	18.30	6.49
Middle.	20,778	1,472,625,232	\$70,850	\$193,825,252	9,340	12.00	4.37
West'n.	10,583	401,913,267	\$37,955	\$47,788,539	4,500	1.80	4.09
South'n.	1,368	131,573,990	\$95,300	\$13,900,727	10,161	10.50	6.00
Pacific.							
U. S. ....	57,323	3,159,425,057	\$55,116	\$473,241,055	8,256	15.00	5.20
G. B'n.	15,376	2,763,400,535	178,720	244,463,900	15,900	8.49	4.65



## STATEMENT OF THE MILEAGE OF RAILROADS IN EACH STATE, AND GROUP OF STATES, 1841-1872.

MILES OF RAILROAD IN	1841	1842	1843	1844	1845	1846	1847	1848	1849	1850	1851	1852	1853	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872
1. Maine.....	11	62	61	62	62	62	62	90	168	243	293	323	334	361	415	429	451	468	472	477	472	505	505	505	521	521	521	560	580	786	871	871
2. New Hampshire.....	53	88	92	92	92	92	175	223	336	467	537	568	644	647	657	657	657	667	667	667	667	667	667	667	667	667	667	667	667	667	667	667
3. Vermont.....	373	435	485	485	567	636	718	796	948	1035	1,038	1,047	1,105	1,144	1,264	1,304	1,364	1,364	1,364	1,364	1,364	1,364	1,364	1,364	1,364	1,364	1,364	1,364	1,364	1,364	1,364	
4. Massachusetts.....	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
5. Rhode Island.....	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
6. Connecticut.....	102	176	176	176	202	202	202	202	289	402	451	496	496	496	496	590	590	590	601	601	601	630	630	630	630	630	630	630	630	630	630	
New Eng. States.....	559	811	865	865	937	1032	1225	1276	2073	2508	2,800	2,973	3,153	3,250	3,469	3,577	3,599	3,616	3,652	3,660	3,697	3,751	3,793	3,793	3,894	3,894	3,894	4,019	4,291	4,494	4,976	
7. New York.....	536	630	648	715	791	737	764	969	1180	1361	1,633	2,011	2,357	2,531	2,382	2,629	2,911	2,961	2,679	2,662	2,697	2,728	2,792	2,881	3,002	3,178	3,343	3,329	3,693	3,928	4,470	5,025
8. New Jersey.....	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186	
9. Pennsylvania.....	754	789	789	798	798	798	840	1,006	1,048	1,120	1,240	1,297	1,372	1,404	1,531	1,800	1,925	2,061	2,330	2,449	2,507	2,602	2,638	2,737	2,884	2,944	3,002	3,002	3,002	3,002	3,002	
10. Delaware.....	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	
11. Maryland and D. C.....	259	259	259	259	259	259	259	259	259	259	259	274	327	327	327	327	327	352	352	377	386	386	408	408	446	446	446	446	446	446	446	
12. West Virginia.....	61	97	97	97	97	97	97	97	97	97	97	159	241	241	241	241	241	241	241	241	241	241	241	241	241	241	241	241	241	241	241	
Middle States.....	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	
13. Ohio.....	36	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	
14. Michigan.....	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	
15. Indiana.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
16. Illinois.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
17. Wisconsin.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
18. Minnesota.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
19. Iowa.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
20. Kansas.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
21. Nebraska.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
22. Missouri.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
23. Mississippi.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
24. Wyoming Ter.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
25. Utah.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
26. Dakota.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
27. Colorado.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
28. Indian Ter.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
Western States.....	196	244	280	312	374	419	608	679	737	1276	1,816	2,426	3,708	4,001	4,567	7,024	8,186	9,595	10,427	11,051	11,320	11,657	12,221	12,497	12,847	13,621	15,226	16,889	19,884	23,540	28,388	
29. Virginia.....	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223
30. North Carolina.....	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	
31. South Carolina.....	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
32. Georgia.....	271	323	368	432	516	576	609	639	639	639	795	910	962	962	1,030	1,165	1,242	1,297	1,371	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	
33. Florida.....	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	
34. Alabama.....	14	14	26	26	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	
35. Mississippi.....	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
36. Louisiana.....	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
37. Texas.....	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	
38. Kentucky.....	112	185	191	329	466	541	770	888	963	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	1,253	
39. Tennessee.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
40. Arkansas.....	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
Southern States.....	913	965	1022	1106	1186	1331	1415	1523	1664	2035	2,541	3,181	3,754	4,411	4,837	5,707	6,627	7,386	8,274	9,182	9,229	9,422	9,468	9,511	9,							

## RECAPITULATION.

STATES.	1841	1842	1843	1844	1845	1846	1847	1848	1849	1850	185
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